



Wireless Broadband Router

MI424WR

User's Manual

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Introduction

Thank you for purchasing the Wireless Broadband Router. The Wireless Broadband Router supports Multimedia over Coax Alliance (MoCA), a new networking standard that allows digital entertainment and information to be transmitted and distributed to multiple devices over coaxial cables. The Router also supports Ethernet and Wi-Fi networking, making it the most versatile router available. If you want to take your home or office networking to the next level, the Wireless Broadband Router is sure to be one of the keys to your success.



Package Contents

- Wireless Broadband Router
- Black Power cord
- Yellow cable (Ethernet, 6 ft.)
- White cable (Ethernet, 10 ft.)
- Quick Start Guide
- Installation Guide
- User Manual CD
- Wireless Networking Guide
- Wall-mount template

- Wall-mount template
- Vertical stand
- Warranty

Minimum System Requirements

- Computer with Ethernet capability
- Microsoft Windows 98SE, Me, 2000, or XP; Mac OS 9 or greater; Linux/ BSD, Unix
- Internet Explorer 5.0 or higher; Netscape Navigator 7.0 or higher
- TCP/IP network protocol installed on each computer

Features

- Supports multiple networking standards, including:
 - WAN - Ethernet and MoCA interfaces
 - LAN - 802.11g, 802.11b, Ethernet, and MoCA
- Integrated wired networking with 4-port 10/100 Mbps Ethernet switch and MoCA
- Integrated wireless networking with 802.11g access point featuring:
 - 802.11g enabled to support speeds up to 54 Mbps wirelessly
 - 802.11b backward compatible, communicating with 802.11b wireless products at speeds up to 11 Mbps
- Enterprise-level security, including :
 - Fully customizable firewall with Stateful Packet Inspection
 - Content filtering with URL-keyword based filtering, parental control, customizable filtering policies per computer, and E-mail notification
 - Denial of service protection against IP spoofing attacks, intrusion and scanning attacks, IP fragment overlap, ping of death, and fragmentation attacks
 - Event logging

- Intrusion detection
- MAC address filtering
- NAT
- DMZ hosting
- Access control
- Advanced wireless protection featuring WPA, WEP 64/128 bit encryption, 802.1x authentication, and MAC address filtering
- ICSA certified
- Other Features
 - DHCP server option
 - DHCP server/PPPoE server auto-detection
 - DNS server
 - LAN IP and WAN IP address selection
 - MAC address cloning
 - Port forwarding
 - PPPoE support
 - QoS support (end to end layer 2/3) featuring Diffserv, 802.1p/q prioritization, configurable upstream/downstream traffic shaping, random early detection and pass-through of WAN-side DSCPs, PHBs, and queuing to LAN-side devices
 - Remote management and secured remote management using HTTPS
 - Reverse NAT
 - Static NAT
 - Static routing
 - Time zone support
 - VLAN multicast support
 - VPN IPSec (VPN passthrough only)

Getting to Know the Router

This section contains a quick description of the Router's lights (LEDs), ports, etc. The Router features several indicator lights on its front panel, and a series of ports and switches on its rear panel.

Front Panel

The front panel of the Router features ten indicator lights: Power, WAN Ethernet, WAN Coax, Internet, LAN Ethernet (4), LAN Coax, and Wireless.



Power Light

The Power light displays the Router's current status. If the Power light glows steadily green, the Router is receiving power and fully operational. When the Power light flashes rapidly, the Router is initializing. If the Power light is not illuminated or glows red when the Power cord is plugged in and the Power switch is turned on, the Router has suffered a critical error and technical support should be contacted.

WAN Ethernet Light

The WAN Ethernet light illuminates when the Router is connected to the Internet via Ethernet. If flashing, data traffic is passing across the port.

WAN Coax Light

The WAN Coax light glows steadily or flashes when the Router is connected to the Internet via coaxial cable.

Internet Light

When the Internet light glows steadily green, the Router is connected to the ISP (Internet Service Provider). If it glows amber, there is a physical connection to the ONT (Optical Network Terminator), but authentication has not taken place (i.e., no IP address is present).

LAN Ethernet Lights (1, 2, 3, 4)

The LAN Ethernet lights illuminate when the Router is connected to a local network via one or more of its Ethernet ports. If flashing, data traffic is passing across the port(s).

LAN Coax Light

The LAN Coax light glows steadily or flashes when the Router is connected to a local network via its Coax port.

Wireless Light

The Wireless light illuminates when the Router's wireless access point is turned on. If flashing, data traffic is passing across the wireless connection.

Rear Panel

The rear panel of the Router features seven ports (Coax, WAN Ethernet, LAN Ethernet [4], and Power), as well as a Reset button and Power switch.



Coax Port

The Coax port connects the Router to the ISP or other devices using a coaxial cable.

Reset Button

To restore the Router's factory default settings, press and hold the Reset button for approximately ten seconds. The reset process will start about ten seconds after releasing the button. When the Router resets, all the lights on the front panel turn off, and then some of the lights start flashing. The Router has completed its reset process when the Power light glows steadily green.

 **Caution:** Do not unplug the Power cord from the Router during the reset process. Doing so may result in the loss of the Router's configuration information. If this occurs, reset the Router again.

WAN Ethernet Port

The WAN Ethernet port connects the Router to the ISP using an Ethernet cable.

LAN Ethernet Ports (4)

The LAN Ethernet ports connect devices to the Router via Ethernet cables to create a local area network (LAN). The LAN Ethernet ports are 10/100 Mbps auto-sensing ports, and either a straight-through or crossover Ethernet cable can be used when connecting devices to the ports.

Power Switch

The Power switch powers the Router on and off.

Power Port

The Power port connects the Router to an electrical wall outlet via the Power cord.

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Connecting the Router

2

Connecting a computer or local network to the Wireless Broadband Router is a simple procedure, varying slightly depending on the computer's operating system but designed to seamlessly integrate the Router with the computer or local network. Moreover, addition configuration to access the GUI is not required when taking advantage of Universal Plug-and-Play support in Windows XP.

The Windows default network settings dictate that in most cases, the setup procedure described in the "Computer Network Configuration" will be unnecessary. For example, the default DHCP setting in Windows 2000 is "client," requiring no further modification.

However, we advise following the setup procedure described below to verify all communication parameters are valid and the physical cable connections are correct.

Setting Up the Router

There are three parts to setting up the Router: Connecting the Cables, Configuring the Router, and Connecting Other Computers/Set Top Boxes.

Connecting the Cables

 **Note:** If a different router was being used, disconnect it. Remove all router components, including power supplies and cables, since they will not work with the Wireless Broadband Router.

1. Get the Router and black Power cord from the box.
2. Plug the black Power cord in the black port on the back of the Router and then into a power outlet.
3. Turn the Router on.
4. Make sure the Power light on the front of the Router is glows steadily green.
5. Plug the yellow Ethernet cable from the box into one of the four yellow Ethernet ports on the back of the Router.

6. Make sure the computer is powered on, then plug the other end of the yellow Ethernet cable into an Ethernet port on the computer.
7. Make sure at least one of the Ethernet LAN lights on the front of the Router glows steadily green. This may take a few moments.
8. The phone company previously installed a high-speed wall jack somewhere in the house. Locate it and note its type (Ethernet or coaxial). If Ethernet, follow steps 8a and 8b. If coaxial, follow steps 9a and 9b. Then, continue to step 10.
 - a) If connecting via Ethernet, get the white Ethernet cable from the box and plug one end in the white port on the back of the Router.
 - b) Plug the other end of the white Ethernet cable into the high-speed Ethernet jack.
9. a) If connecting via coaxial cable, get a coaxial cable and connect one end to the red Coax port on the back of the Router.
 - b) Connect the other end of the coaxial cable to a coax jack.
10. Make sure the Ethernet WAN light (if connecting via Ethernet) or Coax WAN light (if connecting via coaxial cable) on the front of the Router glows steadily green. If connecting via coaxial cable, this may take a few minutes.



Note: If the Ethernet WAN light or Coax WAN light does not illuminate, make sure the cable (Ethernet or coaxial) is connected properly at both ends.

Computer Network Configuration

Each network interface on the computer should either be configured with a statically defined IP address and DNS address, or instructed to automatically obtain an IP address using the Network DHCP server. The Router is set up, by default, with an active DHCP server, and we recommend leaving this setting as is.

Configuring Dynamic IP Addressing

To set up a computer to use dynamic IP addressing:

Windows XP

1. Select **Network Connections** in the Control Panel.
2. Right-click **Ethernet Local Area Connection**, then click **Properties**.
3. In the “General” tab, select **Internet Protocol (TCP/IP)**, then click **Properties**.
4. The “Internet Protocol (TCP/IP) Properties” window appears.
5. Click the “Obtain an IP address automatically” radio button.
6. Click the “Obtain DNS server address automatically” radio button.
7. Click **OK** in the “(TCP/IP) Properties” screen, then click **OK** in the “Local Area Connection Properties” screen to save the settings.

Windows 2000

1. Select **Network and Dialing Connections** in the Control Panel.
2. Right-click on the Ethernet connection’s icon, then click **Properties**.
3. Select **Internet Protocol (TCP/IP)** component, then click **Properties**.
4. The “Internet Protocol (TCP/IP) Properties” window appears.
5. Click the “Obtain an IP address automatically” radio button.
6. Click the “Obtain DNS server address automatically” radio button.

Windows 98/Me

1. Select **Network** in the Control Panel.
2. Select the TCP/IP settings for the network card, then click **Properties**.
3. Click the “Obtain an IP address automatically” radio button in the “IP Address” tab.
4. Click **Disable DNS** in the DNS configuration tab.
5. Click **OK** in the “TCP/IP Properties” screen.
6. Click **OK** in the “Network” screen to reboot and save the settings.

Windows NT

1. Click **Network** in the Control Panel. The “Network” window appears.
2. In the “Protocol” tab, select **Internet Protocol (TCP/IP)** then click **Properties**.
3. In the “IP Address” tab, click the “Obtain an IP address automatically” radio button.
4. In the “DNS” tab, verify no DNS server is defined in the “DNS Service Search Order” text box and no suffix is defined in the “Domain Suffix Search Order” text box.

Linux

1. Login into the system as a super-user, by entering “su” at the prompt.
2. Type “ifconfig” to display the network devices and allocated IPs.
3. Type “pump -i <dev>,” where <dev> is the network device name.
4. Type “ifconfig” again to view the newly allocated IP address.
5. Make sure no firewall is active on device <dev>.

Configuring the Router

1. Open a web browser on the computer connected to the Router. In the “Address” text box, type:

http://192.168.1.1

then press **Enter** on the keyboard.



2. The “Login” screen appears. Enter the default user name (admin) and password (password) in the appropriate text boxes, then click **OK**.



3. The “Login Setup” screen appears. Select a new user name and password and enter them in the appropriate text boxes (the password must be entered twice, for validation purposes). Write the new user name and password down on a piece of paper and keep it in a safe place, since they will be needed to access the Router’s MegaControl Panel™ in the future.



4. In the bottom part of the screen, select the correct time zone from the “Time Zone” drop-down list, then click **OK** at the bottom of the screen.

The Router is now configured.

Connecting Other Computers/Set Top Boxes

The Router can connect to other computers or set top boxes in three ways: via Ethernet, via wireless connection, or via coaxial cable.

Ethernet

1. Get an Ethernet cable and plug one end into one of the open yellow Ethernet ports on the back of the Router.
2. Plug the other end of the Ethernet cable into an Ethernet port on the computer.
3. Make sure the corresponding Ethernet LAN light on the front of the Router glows steadily green.
4. Repeat these steps for each computer to be connected to the Router via Ethernet.

Wireless

1. Make sure each computer to be connected wirelessly has built-in wireless or an attached wireless adapter.
2. Make sure the computer uses the same ESSID and WEP key as the Router by launching the computer's wireless application
3. Enter the ESSID and WEP key found on the sticker on the bottom of the Router in the computer's wireless settings and click **Save**. Make sure to configure the computer to use 64/40-bit WEP encryption.
4. Make sure the changes were implemented by surfing the Internet from the computer.
5. Repeat these steps for every other computer to be connected to the Router wirelessly.

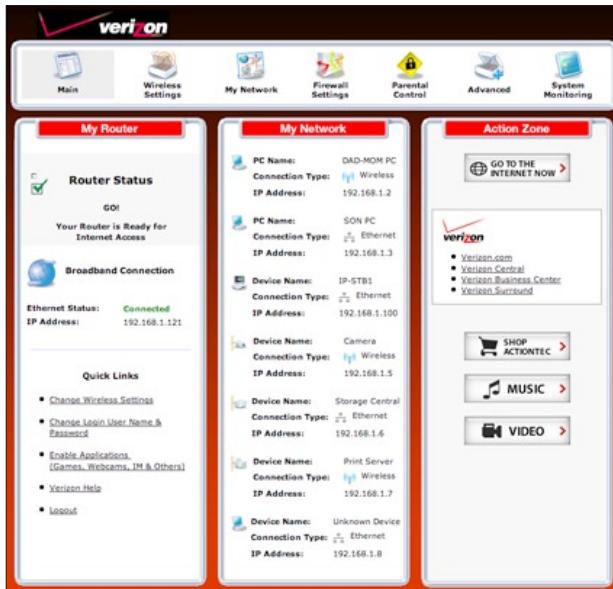
Coaxial

1. Make sure all set top boxes are turned off.
2. Disconnect any adapter currently connected to the coaxial jack in the room where the Router is.

3. Connect one end of the coaxial cable to the coaxial wall jack, and the other end to the red Coax port on the back of the Router.
4. Power up the set top box.
5. Make sure the Coax LAN light on the front of the Router glows steadily green. This may take a few minutes. When it does, the set top box is connected to the Router.

Home Page

After logging into the Router's MegaControl Panel (see "Configuring the Router" at the beginning of this chapter), the "Home" screen appears.



The Home screen has a "Main Menu" that occupies the top of the screen. Below that, the screen is divided into three columns: "My Router," "My Network," and "Action Zone."

Main Menu

The “Main Menu” contains links to all of the configuration options of the Router: **Wireless Setup** (explained in chapter 4 of this manual), **My Network** (chapter 5), **Firewall** (chapter 6), **Parental Controls** (chapter 7), **Advanced** (chapter 8), and **System Monitoring** (chapter 9).

My Router

This section displays the status of the Router’s network and Internet connection. A green light signifies the Router is connected; a yellow light means the Router is attempting to connect; and a red light signifies the Router’s connection is down.

Broadband Connection

The “Broadband Connection” section of My Router displays the state of the Router’s broadband connection (“Connected” or “Disconnected”) for the two connection options (“Coax Status” and “Ethernet Status”), and the WAN IP address of the broadband connection.

Quick Links

The “Quick Links” section of My Router contains a list of frequently accessed settings, including “Change Wireless Settings,” “Change Login User Name & Password,” “Enable Gaming,” and “Logout.”

My Network

The “My Network” section of the Home screen displays the connection type, name, and IP address of all devices connected to the Router’s network. The icon associated with the device will be displayed normally (signifying an active device) or shaded (signifying the device has not been active for at least 60 seconds). The user can also configure the basic settings of each device by clicking on its icon. These settings are described in more detail in chapter 3, “Configuring My Network Settings.”

Action Zone

This section contains links to various Verizon Web sites, and other informational links. Clicking on the icon above “Go to Internet Now” connects the user to the home page configured on the user’s web browser.

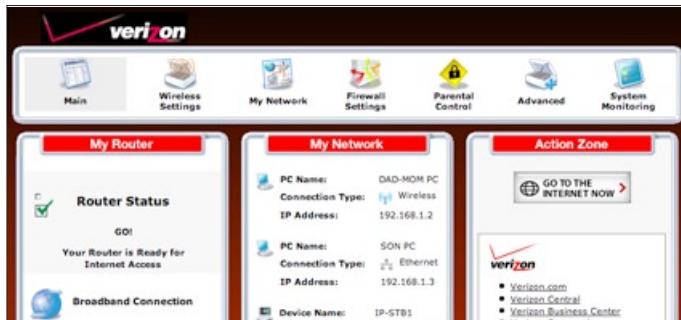
Configuring My Network Settings

3

Once the Wireless Broadband Router is physically connected and the MegaControl Panel's Home screen is displayed in a web browser, a list of the devices connected to the Router's network appears in the "My Network" section of the screen. From here, some basic network settings can be configured.

Accessing My Network

To access My Network, click on "My Network" in the Home screen.



The "My Network" screen appears:

My Network		Connected Devices
DAD-MOM PC Connection type: Wireless IP Address: 192.168.1.2 IP Address Allocation: DHCP MAC Address: 00:0E:B3:11.11.11	<ul style="list-style-type: none">Access Shared FilesWebsite BlockingBlock Internet ServicesEnable ApplicationView Device DetailsRename this DeviceTimeout for Inactive Device	<ul style="list-style-type: none">Ethernet : 3 device(s)Wireless : 3 device(s)
SON PC Connection type: Ethernet IP Address: 192.168.1.3 IP Address Allocation: DHCP	<ul style="list-style-type: none">Access Shared FilesWebsite BlockingBlock Internet ServicesEnable Application	

On the far right side of the screen, in the "Connected Devices" section, is a list of the devices currently connected to the network, listed by connection type and number. The rest of the screen contains the "My Network" section, which displays each device connected to the network, and a series of configuration settings.

Using My Network

Various settings can be accessed for a particular device, as follows.

Access Device

For devices that can be accessed (such as Internet cameras and networked hard drives), locate it in the My Network column, then click **Access Devices** to use the device over the network.

Access Shared Files

To access the shared files on a particular device, locate the device in the My Network column, then click **Access Shared Files**. A list of shared files appears on the screen.

Website Blocking

Clicking “Website Blocking” generates the “Parental Control” screen. For more information about using parental controls, see chapter 7, “Using Parental Controls.”

Block Internet Services

Internet services blocking is used to prevent a device on the network from accessing particular services on the Internet, such as receiving E-mail or downloading from FTP sites. To set up Internet services blocking on a networked device, locate the device in the My Network column, then click **Block Internet Services**. The “Access Control” screen appears.

Access Control				
Block Internet Services / Protocols like, E-mail or Internet access for any computer on your network.				
Blocked	Networked Computer / Device	Network Address	Protocols	Status
Add				
Allowed				
Allowed	Networked Computer / Device	Network Address	Protocols	Status
<input checked="" type="checkbox"/> Any	Any	DHCP - UDP 67-68 -> 67	Active	 
<input checked="" type="checkbox"/> Any	Any	DNS - TCP 53 -> 53 TCP 1024-65535 -> 53 UDP 53 -> 53 UDP 1024-65535 -> 53	Active	 

1. Click **Add** in the “Networked computer/Device” column. The “Add Access Control Rule” screen appears.



2. If this access control rule applies to all networked devices, select “Any” from the “Networked Computer/Device” list box. If this rule applies to certain devices only, select “Specify Address” and click **Add**. Then, add a network object (for more details about adding network objects, see the “Advanced Settings” chapter of this manual).
3. Select the Internet protocol to be blocked from the “Protocol” drop-down list.
4. If this rule will be active all the time, select “Always” from the “When should this rule occur?” drop-down list. If the rule will only be active at certain times select “Specify Schedule” and click **Add**. Then, add a schedule rule (for more details about schedule rules, see the “Advanced Settings” chapter of this manual).



Note: Make sure the Router’s date and time settings for your time zone are set correctly for schedule rules to function properly.

5. Click **Apply** to save the changes. The Access Control screen will display a summary of the access control rule.



Note: To block a service that is not included in the list select “Specify Protocol” from the Protocol drop-down menu. The “Edit Service” screen appears. Define the service, then click **Apply**. The service will then be automatically added to the top section of the “Add Access Control Rule” screen, and will be selectable.

The user may disable an access control and the service made available without having to remove the service from the Access Control table. This may be useful to make the service available only temporarily, with the expectation that the restriction will be reinstated later.

- To temporarily disable an access control clear the check box next to the network computer/device.
- To reinstate the restriction at a later time select the check box next to the network computer/device.
- To remove an access restriction from the Access Control table click the Remove button for the service. The service will be removed from the Access Control table.



Note: When Web Filtering is enabled, HTTP services cannot be blocked by access control.

Enable Application

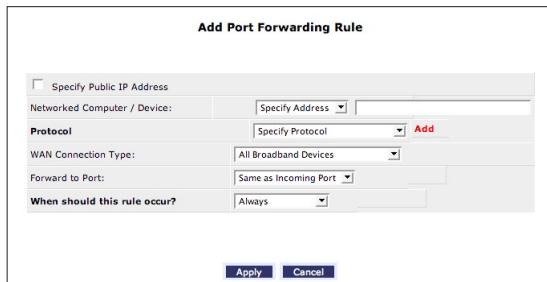
Activating “Enable Application” (also known as port forwarding) allows the network to be exposed to the Internet in certain limited and controlled ways, enabling some applications to work from the local network (game, voice, and chat applications, for example), as well as allowing Internet access to servers in the network. To set this up on a networked device, locate the device in the My Network column, then click **Enable Applications**. The “Port Forwarding” screen appears.

Port Forwarding
This feature enables applications(Games, Webcams, IM & Others) by opening a tunnel between remote(Internet) computers and a specific device port inside your local area network(LAN).

Networked Computer / Device	Network Address	Public IP Address	Protocols	WAN Connection Type	Status	Action
Add						

Buttons:

1. Click **Add**. The “Add Port Forwarding Rule” screen appears.



2. Enter the local IP address or the host name of the computer providing the service in the “Networked Computer/Device” text box. Note that only one local network computer can be assigned to provide a specific service or application.
3. Select the Internet protocol to be provided from the “Protocol” drop-down list.
4. To select a port to forward communications to (this is optional), select “Specify” from the “Forward to Port” drop-down list, then, in the text box that appears, enter the port number. If no port is identified, select “Same as Incoming Port.”
5. If this port will be active all the time, select “Always” from the “When should this rule occur?” drop-down list. If the rule will only be active at certain times select “Specify Schedule” and click **Add**. Then, add a schedule rule (for more details about schedule rules, see the “Advanced Settings” chapter of this manual).
6. Click **Apply** to save the changes.



Note: Some applications, such as FTP, TFTP, PPTP, and H323, require the support of special specific Application Level Gateway (ALG) modules to work inside the local network. Data packets associated with these applications contain information that allows them to be routed correctly. An ALG is needed to handle these packets and ensure they reach their intended destinations. The Router is equipped with a robust list of ALG modules, enabling maximum functionality in the local network.

The ALG is automatically assigned based on the destination port.

View Device Details

To view information about a networked device, or to test a device's connection, locate the device in the My Network column, then click **View Device Details**. The "Device Information" screen appears.

Device Information
This screen provides a detailed breakdown for this device.

Device:	DAD-MOM PC
IP Address:	192.168.1.1
Subnet Mask:	255.255.255.0
MAC Address:	00:0E:B3:11.11.11
Network Connection:	Bridge
Lease Type:	Dynamic
Port Forwarding Services:	None
Windows Shared Folders:	\\DAD-MOM.home\\

To test if this device is connected to your broad band home router, click the "Test Connectivity" button.

Ping Test: **Test Connectivity**

Close

1. Click **Test Connectivity**. The "Diagnostics" screen appears.

Diagnostics
The information below has been determined.

• Diagnostics can assist in testing network connectivity. This feature pings (ICMP echo) an IP address and displays the results, such as the number of packets transmitted and received, round trip time, and success status.

Ping (ICMP Echo)

Destination:	192.168.1.2	Go
Number of pings:	4	
Status:	Test Failed	
packets:	4/4 transmitted, 0/4 received, 100% loss	
Round Trip Time:	Minimum = 2147483647 ms Maximum = 0 ms Average = 0 ms	

Press the **Refresh** button to update the status.

Close **Refresh** **Back**

2. Click **Go**. The Router runs a ping test, and the results are displayed in the Diagnostics screen.

Rename This Device

To rename a networked device, locate the device in the My Network column, then click **Rename This Device**. The “Rename Device” screen appears.

Rename Device

This Page allows you to change the name of this device, and how it is identified on your network

Current Device Name: DAD-MOM PC

To rename this device, type the new Device Name below and click Apply

New Name:

To assign an icon to this device, select from the drop-down box below and click Apply

New Icon: 

Apply **Back**

Enter the new name of the device in the “New Name” text box and, if needed, select a new icon for the device from the “New Icon” drop-down list.

Timeout for Inactive Device

The amount of time a device continues to be displayed on the network after it has been disconnected is configured in the “Timeout for Inactive Device” screen. To display the screen, click **Timeout for Inactive Device**.

Timeout for Inactive Device

After a device is removed from the router, the setting below is the time frame that it will take for the device to no longer be displayed on the network. This page allows you to change the time out setting.

Please select the desired time frame then click the Apply button for the settings to take affect.

Timeout:

Apply **Back**

Select the timeout period from the “Timeout” drop-down list. After the device has been disconnected for this amount of time, it will no longer be displayed in the “My Network” column.

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Creating a Wireless Network

4

This chapter explains how to create a wireless network using the Wireless Broadband Router, including accessing and configuring wireless security options.

Overview

The Wireless Broadband Router provides the user with wireless connectivity over the 802.11b and g standards (the most common wireless standards). 802.11b has a maximum data rate of 11 Mbps, while 802.11g has a maximum data rate of 54 Mbps. Both operate in the 2.4 GHz range.

The Router's wireless feature is turned on, with wireless security activated, by default. The level of security is 64/40-bit WEP, with a unique WEP key already entered. This information is displayed on a sticker located on the bottom of the Router.

The Router integrates multiple layers of security. These include the IEEE 802.1x port-based authentication protocol, RADIUS client, EAP-MD5, EAP-TLS, EAP-TTLS, EAP-PEAP, Wired Equivalent Privacy (WEP), Wi-Fi Protected Access (WPA) and firewall and VPN applications.

Connecting a Wireless Client

To connect a wireless client to the Router:



Note: The following procedure assumes the Router's default wireless settings are intact. If they have been changed, use the new ESSID and wireless security settings. For more details, see the "Connecting a Wireless Windows XP Client" section of this chapter.

1. In the wireless client's configuration interface, enter the Router's ESSID (found on a sticker on the bottom of the Router's case) in the appropriate text box or field (this varies depending on the wireless client's manufacturer).
2. Enter the Router's WEP key (also found on the sticker on the bottom of the Router's case) in the wireless client's configuration interface.
3. Save the changes and exit the wireless client's configuration interface. The client should now detect and join the Router's wireless network. If not, check the wireless client's documentation, or contact its manufacturer.

Wireless Status

Clicking on the “Wireless Settings” icon in the Home screen generates the “Wireless Status” screen, which displays the current status of the wireless connection.

Wireless Status	
Radio Enabled:	YES
SSID:	4PUNO
Channel:	9
Security Enabled:	YES
WEP 64-bit:	0FB310FF28
WEP 802.1x:	N/A
WPA:	N/A
SSID Broadcast:	Enabled
MAC Authentication:	Disabled
Wireless Mode:	Mixed accepts 802.11b and 802.11g connections
Packets Sent:	0
Packets Received:	0

Radio Enabled

Displays whether the Router’s wireless radio is active.

SSID

The SSID (Service Set Identifier) is the network name shared among all devices on a particular wireless network. The SSID must be identical for all devices on the wireless network. It is case-sensitive and must not exceed 32 characters. Make sure the SSID is the same for all devices to be connected to the wireless network. The Router comes from the factory with an SSID already entered and displayed here. The default SSID can also be found on a sticker on the bottom of the Router.

Channel

Displays the channel to which the wireless connection is currently set. All devices on the wireless network must be on the same channel to function correctly.

Security Enabled

Displays what kind of security is active on the wireless connection, and the security encryption key.

SSID Broadcast

Displays whether the Router is broadcasting its SSID. If activated, the SSID of the Router's wireless network is broadcast wirelessly.

MAC Authentication

Displays whether the Router is using MAC (Media Access Control) address authentication to allow wireless devices to join the network.

Wireless Mode

Displays the types of wireless device that can join the network. Options include **802.11b**, **802.11g**, or **Mixed** (allows both 802.11b- and 802.11g-equipped wireless devices to join the network).

Packets Sent/Received

Displays the number of packets sent and received since the Router's wireless capability was activated.

Basic Security Settings

To configure the Router's wireless network for basic security, select "Basic Security Settings" from the menu on the left side of any Wireless Settings screen. The "Basic Security Settings" screen appears.

Basic Security Settings

If you want to setup a wireless network, we recommend that you do the following:

1. Turn Wireless ON

Wireless: On Off

2. Change the SSID setting to any name or code you want.

(SSID is the same thing as the name of your Wireless Network.)

SSID:

3. Channel

To change the channel of the frequency band at which the Router communicates, please enter it below. Then click apply to save your settings.

NOTE: In the United States, use channels 1-11.

Channel:

4. Click on the button next to WEP

(We recommend using WEP because it encrypts your wireless traffic.)

WEP Off

1. Click the "On" radio button to activate the Router's wireless radio.
2. Enter the name of the wireless network in the "SSID" text box.
3. Select the channel at which the Router's wireless radio communicates by selecting it from the "Channel" drop-down list.
4. Click the "WEP" radio button to activate WEP (Wired Equivalent Privacy) security on the wireless network.

5. Select a WEP security level from the “select a WEP Key” drop-down list (options include “64/40 bit” or “128/104 bit”).
6. Enter the key code in the “Key Code” text box. Each character must be a letter from A-F or a number from 0-9. If 64/40 bit was selected in step 5, enter 10 characters. If 128/104 was selected, enter 26 characters.
7. Write down the wireless settings displayed on the screen. Other wireless devices wishing to join the Router’s wireless network must use these same settings when configuring the device’s wireless networking scheme.
8. Click **Apply** to save the settings.

5. Select a WEP Key

NOTE: To create a WEP Key, you need to enter a combination of 10 digits. You can choose any letter from A-F or any number from 0-9.

Sample WEP Key: 0FB310FF28

select a WEP Key:

Key Code:
 0 Digits left

6. Write down wireless settings.

In order for every computer to connect to this Router wirelessly, you need to make sure that the wireless setup for each computer uses the SAME settings listed below. Please make sure that you write down all of the values set on this screen.

Current Wireless Status:	
Wireless:	ON
SSID:	4PUNO
64-BIT WEP:	ON
64-BIT WEP KEY:	0FB310FF28
Channel:	0
SSID Broadcast:	Enabled
MAC Authentication:	Disabled
Wireless Mode:	Mixed - accepts 802.11b and 802.11g connections
packets Sent:	155382
packets Received:	8106727

Advanced Security Settings

To configure the Router's advanced wireless network security settings, select "Advanced Security Settings" from the menu on the left side of any Wireless Settings screen. The "Advanced Security Settings" screen appears.



Note: The advanced settings should only be configured by experienced technical users.

Advanced Security Settings

IMPORTANT: Only the advanced, more technical user should use this page.

Please select the item that you want to adjust the settings for, then select the **Next** button below.

Level 1: Securing your wireless traffic as it transmits through the air.

WEP (Recommended)

WEP + 802.1x (For enterprise networks only)

WPA (Allows you to enable a pre-shared key for a home network or more advanced security for an enterprise network)

Level 2: Stop your Router from broadcasting your Wireless Network Name (SSID)

SSID Broadcast (Allows you to prevent users who do not know your SSID name to access your Router wirelessly.)

Level 3: Limit access to certain wireless devices

Wireless MAC Authentication (Allows you to limit access to your wireless network by allowing only those devices with specific MAC addresses.)

802.11b/g Mode (Allows you to limit access to your wireless network based on the type of technology.)

Other Advanced Wireless Options

Level 1 (Wireless Security)

This section is used to configure different types of wireless security. Select the type of wireless security to apply to the wireless network by clicking the appropriate radio button, then configure the security settings in the subsequent screens.

Level 1: Securing your wireless traffic as it transmits through the air.

WEP (Recommended)

WEP + 802.1x (For enterprise networks only)

WPA (Allows you to enable a pre-shared key for a home network or more advanced security for an enterprise network)

WEP

If WEP was selected in the Advanced Security Settings screen, the “WEP Key” screen appears.

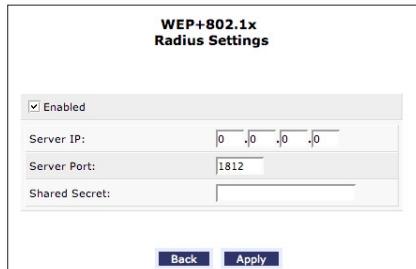
Active	Encryption Key	Entry Method	Key Length
<input checked="" type="radio"/> 1	0FB3A72706	Hex	64/40 bit
<input type="radio"/> 2		Hex	64/40 bit
<input type="radio"/> 3		Hex	64/40 bit
<input type="radio"/> 4		Hex	64/40 bit

Back **Apply**

1. Select the appropriate network authentication level from the drop-down list. Options include **Open System Authentication**, **Shared Key Authentication**, or **Both**.
2. Activate WEP key 1 by clicking the radio button next to “1” on the left side.
3. Select the length of key 1 by selecting “64/40 bit” or “128/104 bit” from the appropriate drop-down list in the “Key Length” column.
4. Select the type of key from the appropriate drop-down list in the “Entry Method” column. If “Hex” is selected, the key must be made up of hexadecimal digits. If “ASCII” is selected, the key can be made up of any characters.
5. Enter the key in the appropriate text box in the “Encryption Key” column. If 64/40 bit was chosen in step 2, enter 10 characters. If 128/104 bit was chosen, enter 24 characters. Depending on what option was selected in step 3, enter hexadecimal or ASCII characters.
6. Click **Apply** to save changes.

802.1X WEP

If 802.1X WEP (Wired Equivalent Privacy) was selected, the “WEP+802.1x Radius Settings” screen appears. To generate the full screen, click in the “Enabled” check box to activate.



802.1x WEP is a robust security protocol that uses port control with dynamically changing encryption keys automatically updated over the network. 802.11x WEP uses a RADIUS (Remote Authentication Dial-in Service) server for authentication purposes. This server must be physically connected to the Router. Also, the user must enable the RADIUS client embedded in the Router (to do this, see chapter 9, “Advanced Settings”).

1. Click in the “Enabled” check box to enable WEP+802.1x security.
2. Enter the RADIUS server IP address in the “Server IP” text boxes.
3. Enter the RADIUS server’s port number in the “Server Port” text box.
4. Enter the RADIUS server’s shared secret in the “Shared Secret” text box.
5. Click **Apply** to save changes.

WPA

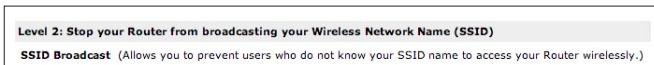
If WPA (Wi-Fi Protected Access) was selected, the “WPA Key” screen appears.

WPA	
Authentication method:	Pre-Shared Key
Pre-Shared Key:	ASCI1
Encryption Algorithm:	TKIP
Group Key Update Interval:	900 Seconds
<input type="button" value="Back"/> <input type="button" value="Apply"/>	

1. Verify the authentication method selected is “Pre-Shared Key.”
2. Enter a phrase of at least eight characters in the “Pre-Shared Key” text box. Verify that “ASCI1” is selected in the associated drop-down list.
3. Select the proper encryption algorithm (TKIP or AES).
4. Click in the “Group Key Update Interval” check box to activate the group key update interval, and set the interval time in the text box to the right.
5. Click **Apply** at the bottom of the screen to save changes.

Level 2 (SSID Broadcast)

This section is used to configure the Router's SSID broadcast capabilities.



Selecting “SSID Broadcast” generates the “SSID Broadcast” screen.



Click the “Enable” radio button to enable SSID broadcasting. If enabled, the SSID of the Router’s wireless network will be broadcast wirelessly. To disable SSID broadcasting, click the “Disable” radio button.

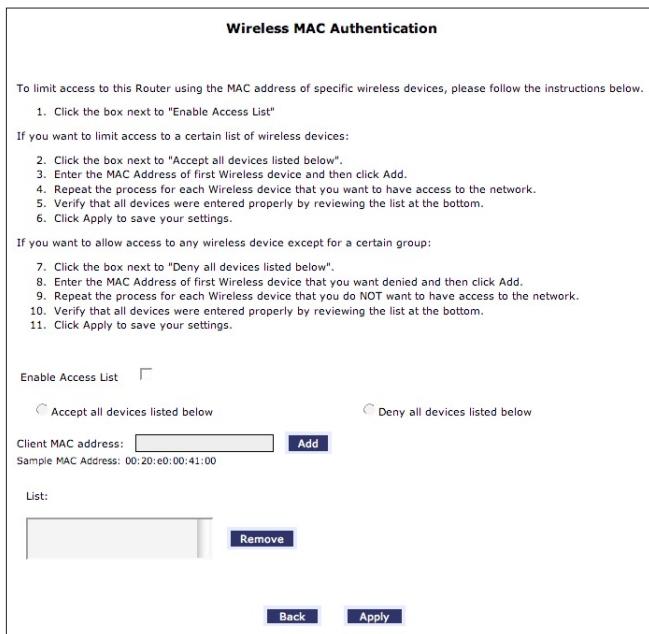
Level 3 (Limiting Access)

This section is used to limit access to the Router's wireless network.



Wireless MAC Authentication

Wireless MAC authentication allows the user to allow or deny access to the Router's wireless network by a particular device's MAC address. Selecting "Wireless MAC Authentication" from the Advanced Security Settings screen generates the "Wireless MAC Authentication" screen.



To set up wireless MAC authentication:

1. Click in the "Enable Access List" check box.
2. Select either "Accept all devices listed below" or "Deny all devices listed below" by clicking the appropriate radio button. Selecting "Accept..." causes all devices listed by MAC address to access the Router's wireless network. Selecting "Deny..." causes all listed devices to be denied access.

3. Enter the MAC address of a device in the “Client MAC address” text box.
4. Click **Add**.
5. Repeat steps 3 and 4 to add more devices to the list.
6. When finished listing devices, click **Apply**.

To remove a MAC address, select it from the “List” list box, then click **Remove**.

802.11b/g Mode

This option allows the user to select the wireless communication standard compatible with the devices to be connected on the wireless network from the drop-down list. Options include **802.11b**, **802.11g**, or **Mixed** (allows both 802.11b and 802.11g-equipped wireless devices to join the network).

802.11b/g

Access to the Router's network can be restricted to wireless devices using either 802.11b (11 Mbps) or 802.11g (54 Mbps) wireless devices. Select the option that best applies to your wireless network. Then click Apply button to save your settings.

NOTE: Actiontec recommends using "Mixed mode" so that both 802.11b and 802.11g devices can access the network.

802.11b/g Mode:

Advanced Wireless Options

Clicking “Other Advanced Wireless Options” at the bottom of the Advanced Security Settings screen generates the “Advanced Wireless Options” screen.

Advanced Wireless Options

When should this rule occur?:	Always
Network:	<input type="button" value="Network (Home/Office)"/>
MTU:	<input type="button" value="Automatic"/> 1500
Transmission Rate:	<input type="button" value="54"/>
CTS Protection Mode:	<input type="button" value="Auto"/>
Beacon Interval:	<input type="button" value="100"/> ms
DTIM Interval:	<input type="button" value="1"/> ms
Fragmentation Threshold:	<input type="button" value="2346"/>
RTS Threshold:	<input type="button" value="2347"/>

When should this rule occur?

Displays the time during which the rule is active. To configure schedule rules, see chapter 9, “Advanced Settings.”

Network

Select the type of connection being configured from this drop-down list (options: **Network [Home/Office]**, **Broadband Connection**, or **DMZ**).

MTU

MTU (Maximum Transmission Unit) specifies the largest packet size permitted for Internet transmission. “Automatic” sets the MTU at 1500. Other choices include “Automatic by DHCP,” which sets the MTU according to the DHCP connection, and “Manual,” which allows the user to set the MTU.

Transmission Rate

Select the wireless transmission rate from the drop-down list, or select “Auto” to have the Router automatically select the best transmission rate. This setting adjusts the bit rate of the Router’s wireless transmissions.

CTS Protection Mode

Activating CTS (Clear to Send) Protection Mode allows mixed 802.11b/g networks to operate at maximum efficiency. Select “Auto” from the drop-down list to activate. Select “None” to deactivate .

Beacon Interval

Beacons are transmitted by the Router to help identify wireless networks. If beacons are transmitted too infrequently, networks may become hard to reach; if too frequently, they become a resource waste. Enter the desired beacon interval value (in milliseconds) in this text box.

DTIM Interval

Enter the DTIM (Delivery Traffic Indication Message) interval value (in milliseconds) in this text box. A DTIM is a countdown mechanism for the Router, informing wireless network clients of the next window for listening to broadcast and multicast messages.

Fragmentation Threshold

Setting the correct fragmentation threshold can increase the reliability of frame transmissions on the wireless network. Enter the fragmentation threshold in this text box.

RTS Threshold

Enter the RTS (Request to Send) threshold in this text box. This setting controls what size data packet the low level RF protocol issues to an RTS packet.

Configuring a Wireless Windows XP Client

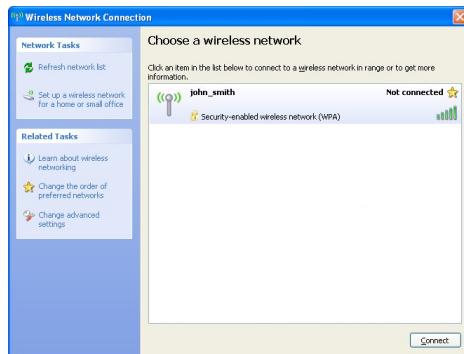
If the computer has wireless capabilities and is running Windows XP, it will automatically recognize this and create a wireless connection. View this connection under Windows' "Network Connections."

 **Note:** The following description and images are in accordance with Microsoft Windows XP, Version 2002, running Service Pack 2. If running another operating system, see the documentation that came with the wireless adapter being used.

1. Click **Network Connections** in the Control Panel. The "Network Connections" window appears.



- Double-click the wireless connection icon. The “Wireless Network Connection” screen appears, displaying all available wireless networks in the vicinity. If the Router is connected and active, the Router’s wireless connection is displayed. Note that the connection’s status is “Not connected” and defined as “Security-enabled wireless network (WPA)” in the figure below.



- Click the connection once to mark it, then click **Connect** at the bottom of the screen. After the connection is established, its status will change to “Connected.”



An icon appears in the notification area, announcing the successful initiation of the wireless connection.



- Test the connection by disabling all other connections in the Network Connections window and browsing the Internet.

The Router’s wireless network can now be accessed from the configured computer. However, any other user with a wireless-equipped device can also access the wireless network. To prevent this, secure the wireless network, as explained in the “Wireless Security” section of this chapter.

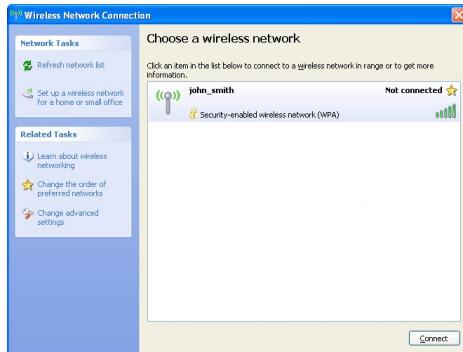
Connecting a Wireless Windows XP Client

This section assumes the Router is set up with WPA security.

1. Click Network Connections in the Control Panel. The “Network Connections” window appears.



2. Double-click the wireless connection icon. The “Wireless Network Connection” screen appears, displaying the Router’s wireless connection. Note that the connection is defined as “Security-enabled wireless network (WPA).”



3. Click the connection once to mark it, then click **Connect** at the bottom of the screen. The following login window appears, asking for a “Network Key,” which is the pre-shared key used when configuring the Router’s WPA security (see the “WPA” section in this chapter).



4. Enter the pre-shared key in both text boxes and click **Connect**. After the connection is established, its status will change to “Connected,” as shown below.



An icon appears in the notification area, announcing the successful initiation of the wireless connection.



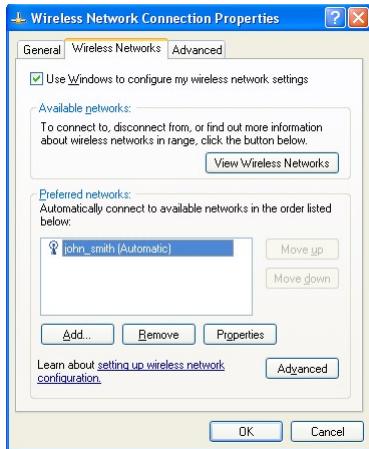
5. Test the connection by disabling all other connections in the Network Connections window and surfing the Internet.

If the login window shown in step 3 does not appear and the connection attempt fails, configure the connection manually using the following procedure:

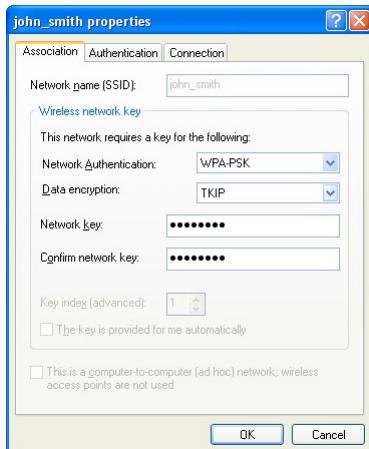
1. Click the connection once to mark it and then click **Change Advanced Settings** in the “Related Tasks” box on the left part of the window.



2. The “Wireless Network Connection Properties” window appears. Select **Wireless Networks**.



3. Click the connection to highlight it, then click **Properties**. The connection's “Properties Window” appears.



4. From the “Network Authentication” drop-down list, select **WPA-PSK**.
5. From the “Data Encryption” drop-down list, select **TKIP**.

6. Enter the pre-shared key in both the “Network key” and the “Confirm network key” text boxes.
7. Click **OK**, then **OK** again.
8. When attempting to connect to the wireless network, the login window appears, pre-populated with the pre-shared key. Press **Connect** to connect.

Since the network is now secured, only users who know the pre-shared key will be able to connect. The WPA security protocol is similar to securing network access using a password.

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Using Network Connections

5

The Wireless Broadband Router supports various local area network (LAN) and wide area network (WAN, on Internet) connections via Ethernet or coaxial cables. Network connections is used to configure the various parameters of the Router's network and Internet connections, and create new connections.



Caution: The settings covered in this chapter should be configured by experienced network technicians only.

To access the Router's network connections, in the “My Network” screen, click **Network Connections** from the menu on the left side. The “Network Connections” screen appears.

Network Connections

NOTE: Ignore the WAN PPPOE Status unless you are a PPPOE customer.

Rule Name	Status	Action
Network (Home/Office)	Connected	
Broadband Connection (Ethernet)	Down	
Broadband Connection (Coax)	Down	
WAN PPPOE	Disabled	
WAN PPPOE 2	Disabled	
Add		

Full Status **Detect Broadband Connection** **Advanced >>**

Click **Advanced** to expand the screen and display all connection entries.

Network Connections

NOTE: Only advanced technical users should use this feature.

Rule Name	Status	Action
Network (Home/Office)	Connected	
Ethernet	Connected	
Wireless Access Point	Connected	
Coax	Down	
Broadband Connection (Ethernet)	Down	
Broadband Connection (Coax)	Down	
WAN PPPOE	Disabled	
WAN PPPOE 2	Disabled	
Add		

Full Status **Detect Broadband Connection** **Basic <<**

To select a connection, click on its name. The rest of this chapter describes the different network connections available on the Router, as well as the connection types that can be created.

Network (Home/Office)

Select **Network (Home/Office)** in the Network Connections screen to generate the “Network (Home/Office) Properties” screen. This screen displays a list of the local network’s properties. The only modifications that can be made from this screen are disabling the connection (by clicking **Disable**) or renaming the connection (by entering a new name in the “Rule Name” text box).

Network (Home/Office) Properties

NOTE: Only advanced technical users should use this feature.

Disable	
Rule Name:	Network (Home/Office)
Status:	Connected
Network:	Network (Home/Office)
Underlying Device:	Ethernet Wireless Access Point Coax
Connection Type:	Bridge
MAC Address:	00:0f:b3:a2:d7:c6
IP Address:	192.168.1.1
Subnet Mask:	255.255.255.0
IP Address Distribution:	DHCP Server
Received Packets:	7138
Sent Packets:	794639
Time Span:	66:41:42

Apply **Cancel** **Settings**



Note: When a network is disabled, its formerly underlying devices will not be able to get the DHCP address from the network interface to which they were connected.

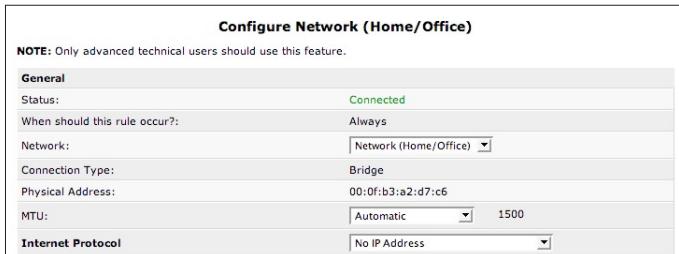
The Network (Home/Office) connection is used to combine several network devices under one virtual network. For example, a home/office network can be created for Ethernet and other network devices.

Configuring the Home/Office Network

Click **Settings** in the “Network (Home/Office) Properties” screen to generate the “Configure Network (Home/Office)” screen.

General

The top part of the Configure Network (Home/Office) screen displays general communication parameters. We recommend not changing the default values in this section unless familiar with networking concepts.



Status Displays the connection status of the network.

When should this rule occur? Displays when the rule is active. To schedule rules, see the “Advanced Settings” chapter.

Network Select the type of connection being configured from the drop-down list (options: **Broadband Connection**, **Network [Home/Office]**, or **DMZ**).

Connection Type Displays the type of connection.

Physical Address Displays the physical address of the network card used for the network.

MTU MTU (Maximum Transmission Unit) specifies the largest packet size permitted for Internet transmission. “Automatic” sets the MTU at 1500. Other choices include “Automatic by DHCP,” which sets the MTU according to the DHCP connection, and “Manual,” which allows the MTU to be set manually.

Internet Protocol

This section has three options: **No IP Address**, **Obtain an IP Address Automatically**, and **Use the Following IP Address**.

No IP Address Select this option if the connection will have no IP address. This is useful if the connection operates under a bridge.

Obtain an IP Address Automatically Select this option if the network connection is required by the ISP to obtain an IP address automatically. The server assigning the IP address also assigns a subnet mask address, which can be overridden by entering another subnet mask address.

Use the Following IP Address Select this option if the network connection uses a permanent (static) IP address, then the IP address and subnet mask address.

Bridge

The “Bridge” section of the Configure Network (Home/Office) screen is used to specify which networks can join the network bridge.

Bridge	Rule Name	Status	STP	Action
	Network (Home/Office)	Connected		
	Broadband Connection (Ethernet)	Down	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	Ethernet	Connected	<input checked="" type="checkbox"/>	
	Broadband Connection (Coax)	Down	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	Coax	Down	<input checked="" type="checkbox"/>	
	Wireless Access Point	Connected	<input checked="" type="checkbox"/>	



Note: When a network is disabled, its formerly underlying devices inherit the network's DHCP settings. For example, the removal of a network configured as DHCP client automatically configures the devices formerly constituting the network as DHCP clients, with the exact DHCP client configuration.

Click in the check box next to the particular network to specify it. Make sure there are no loops in the network configuration, and apply these settings in case the network consists of multiple switches, or other bridges apart from those created by the Router.

Status The “Status” column displays the connection status of a particular device.

STP Click in the device’s “STP” check box to enable Spanning Tree Protocol on the device. This protocol provides path redundancy while preventing undesirable loops in the network.

Action The “Action” column contains an icon that, when clicked, generates the configuration screen of the particular device.

DNS Server

Domain Name System (DNS) is the method by which website or domain names are translated into IP addresses. Specify such an address manually, according to the information provided by the ISP.

To manually configure DNS server addresses, select **Use the Following DNS Server Addresses**. Specify up to two different DNS server addresses, one primary, the other secondary.

DNS Server	
Use the Following DNS Server Addresses <input type="button" value="..."/>	
Primary DNS Server:	<input type="text" value="0.0.0.0"/>
Secondary DNS Server:	<input type="text" value="0.0.0.0"/>

IP Address Distribution

The “IP Address Distribution” section of the Configure Network (Home/Office) screen is used to configure the Router’s Dynamic Host Configuration Protocol (DHCP) server parameters. DHCP automatically assigns IP addresses to network devices. If enabled, make sure to configure the network devices as “DHCP Clients.” There are three options in this section: **Disabled**, **DHCP Server**, and **DHCP Relay**.

Disabled Select this option if statically assigning IP addresses to the network devices.

DHCP Server To set up the network bridge to function as a DHCP server:

1. Select **DHCP Server**.
2. Enter the IP address at which the Router starts issuing addresses in the “Start IP Address” text boxes. Since the Router’s default IP address is 192.168.1.1, the Start IP Address should be 192.168.1.2.
3. Enter the end of the IP address range used to automatically issue IP addresses in the “End IP Address” text boxes. The “maximum” IP address that can be entered here is 192.168.1.253.

4. Enter the subnet mask address in the “Subnet Mask” text boxes. The subnet mask determines which portion of a destination LAN IP address is the network portion, and which portion is the host portion.
5. If Windows Internet Naming Service (WINS) is being used, enter the WINS server address in the “WINS Server” text boxes.
6. Enter the amount of time a network device will be allowed to connect to the Router with its currently issued dynamic IP address in the “Lease Time in Minutes” text box.
7. Click in the “Provide Host Name If Not Specified by Client” check box to have the Router automatically assign network devices with a host name, in case a host name is not provided by the user.

DHCP Relay Select this option to have the Router function as a DHCP relay, and enter the IP address in the screen that appears.

Routing

The Router can be configured to use static or dynamic routing. Dynamic routing automatically adjusts how packets travel on the network, while static routing specifies a fixed routing path to neighboring destinations.

There are two options in the “Routing” section of the Configure Network (Home/Office) screen: **Basic** or **Advanced**.

Basic Select this option for basic routing operation.

Advanced To set up the Router’s network bridge for advanced routing:

1. Select **Advanced** from the “Routing” drop-down menu.
2. Enter a device metric in the “Device Metric” text box. The device metric is a value used by the Router to determine whether one route is superior to another, considering parameters such as bandwidth and delay time.
3. Click in the “Default Route” check box to define this device as the default route.
4. Click in the “Multicast - IGMP Proxy Internal” check box to activate multicasting.

Routing Table

Clicking **New Route** generates the “New Route” window, where a new route can be configured.

Additional IP Addresses

Clicking **New IP Address** generates the “Additional IP Address Settings” screen, where additional IP addresses can be created to access the Router via the Network (Home/Office) connection.

Ethernet Connection

An Ethernet connection connects computers to the Router using Ethernet cables, either directly or via network hubs and switches. Click **Ethernet** in the Network Connections screen (if needed, click **Advanced** at the bottom of the screen to reveal the “Ethernet” link below “Network [Home/Office]”) to generate the “Ethernet Properties” screen. This screen displays a list of the connection’s properties. The only modifications that can be made from this screen are disabling the connection (by clicking **Disable**) or renaming the connection (by entering a new name in the “Rule Name” text box).



Note: If disabling the connection, the Router must be rebooted for the change to take effect.

Configuring the Ethernet Connection

Click **Settings** at the bottom-right of the Ethernet Properties screen to generate the “Configure Ethernet” screen.

Configure Ethernet

NOTE: Only advanced technical users should use this feature.

General				
Status:	Connected			
When should this rule occur?:	Always			
Network:	Network (Home/Office) <input checked="" type="checkbox"/>			
Connection Type:	Ethernet			
Physical Address:	00:0F:b3:a2:d7:c6			
MTU:	Automatic <input type="button" value="▼"/> 1500			
Additional IP Addresses				
4 Ports Ethernet Switch				
<input style="border: none; border-bottom: 1px solid black; padding: 2px 5px; margin-bottom: 5px;" type="button" value="Show"/>				
Port	Status	PVID	VLANs	Action
Port 0	Connected 100 FD			
Port 1	Disconnected			
Port 2	Disconnected			
Port 3	Disconnected			

Apply **Cancel**

General

The top part of the Configure Ethernet screen displays general communication parameters. We recommend not changing the default values in this section unless familiar with networking concepts.

Status Displays the connection status of the Ethernet switch.

When should this rule occur? Displays when the rule is active. To schedule rules, see the “Advanced Settings” chapter.

Network Select the type of connection being configured from the drop-down list (Network [Home/Office], Broadband Connection, or DMZ).

Connection Type Displays the type of connection.

Physical Address Displays the physical address of the network card used for the network.

MTU MTU (Maximum Transmission Unit) specifies the largest packet size permitted for Internet transmission. “Automatic” sets the MTU at 1500. Other choices include “Automatic by DHCP,” which sets the MTU according to the DHCP connection, and “Manual,” which allows the MTU to be set manually.

Additional IP Addresses

Clicking **New IP Address** generates the “Additional IP Address Settings” screen, where additional IP addresses can be created to access the Router via the Ethernet connection.

4 Ports Ethernet Switch

This section displays the connection status of the Router’s four Ethernet ports.

Port	Status	PVID	VLANs	Action
Port 0	Connected 100 FD			
Port 1	Disconnected			
Port 2	Disconnected			
Port 3	Disconnected			

Clicking on a connection’s “Action” icon (in the column on the right) generates the “Port VLANs” screen, where ingress and egress policies can be edited.

Port VLANs

Port 0 Settings

Ingress Policy:

Egress Policy:

Port VLANs IDs

VLAN ID	Action
Add	

Buttons

Coax Connection

A Coax connection connects devices (such as set-top boxes) to the Router using a coaxial cable. Click **Coax** in the Network Connections screen (if needed, click **Advanced** at the bottom of the screen to reveal the “Coax” link below “Network [Home/Office]”) to generate the “Coax Properties” screen. This screen displays a list of the connection’s properties. The only modifications that can be made from this screen are disabling the connection (by clicking **Disable**) or renaming the connection (by entering a new name in the “Name” text box).

Coax Properties

NOTE: Only advanced technical users should use this feature.

Disable	
Rule Name:	Coax
Status:	Down
Network:	Network (Home/Office)
Connection Type:	Coax Link Ethernet
MAC Address:	00:0f:b3:a2:d7:c8
IP Address Distribution:	Disabled
Received Packets:	0
Sent Packets:	0
Time Span:	70:35:15
Channel:	Disconnected

Apply **Cancel** **Settings**

 **Note:** If disabling the connection, the Router must be rebooted for the change to take effect.

Configure Coax

Click **Settings** at the bottom-right of the Coax Properties screen generates the “Configure Coax” screen.

The screenshot shows the 'Configure Coax' screen with the following sections and settings:

- General**
 - Status: Down
 - When should this rule occur?: Always
 - Network: Network (Home/Office)
 - Connection Type: Coax Link Ethernet
 - Physical Address: 00:0f:b3:a2:d7:c8
 - MTU: Automatic (dropdown) 1500
- Coax Link**
 - Channel: 1 - 1150MHz (dropdown)
 - Privacy: Enabled (checkbox)
 - Password: 9999999988888888
- Additional IP Addresses**
 - New IP Address
- Coax Connection Stats**
 - Go to LAN Coax Stats

At the bottom are **Apply** and **Cancel** buttons.

General

The top part of the Configure Coax screen displays general communication parameters. We recommend not changing the default values in this section unless familiar with networking concepts.

Status Displays the status of the coax connection.v

When should this rule occur? Displays when the rule is active. To schedule rules, see the “Advanced Settings” chapter

Network Displays the type of network.

Connection Type Displays the type of connection.

Physical Address Displays the physical address of the network card used for the network.

MTU MTU (Maximum Transmission Unit) specifies the largest packet size permitted for Internet transmission. “Automatic” sets the MTU at 1500. Other choices include “Automatic by DHCP,” which sets the MTU according to the DHCP connection, and “Manual,” which allows the MTU to be set manually.

Coax Link

Set up the coax link options in this section of the Configure Coax screen. Options include **Channel**, **Privacy**, and **Password**.

Channel Select the Channel from the drop-down list (select from 1-6, or “Automatic”).

Privacy Toggle “Privacy” by clicking in the “Enabled” check box. If Privacy is activated, all devices connected via coaxial cable must use the same password. We recommend leaving the Privacy option deactivated.

Password Enter the Coax Link password in this text box.

Additional IP Addresses

Clicking **New IP Address** generates the “Additional IP Address Settings” screen, where additional IP addresses can be created to access the Router via the Coax Link Ethernet connection.

Coax Connection Status

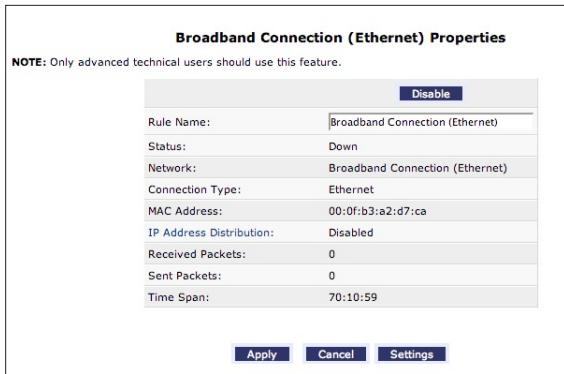
Click **Go to LAN Coax Stats** to generate the “Coax Connection Status” screen, which gives an overview of all the devices connected to the Router via coaxial cable.

Coax Connection Stats							
NOTE: Only advanced technical users should use this feature.							
Channel:	1-1150MHz						
Privacy:	Disabled						
Password:	9999999988888888						
Connection Speed	Router	Device 1	Device 2	Device 3	Device 4	Device 5	Device 6
MAC Address	00:0f:b3:c0:03:59	N/A	N/A	N/A	N/A	N/A	N/A
IP Address	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Router	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Device 1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Device 2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Device 3	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Device 4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Device 5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Device 6	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Device 7	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Close

Broadband Ethernet Connection

A Broadband Ethernet connection connects the Router to the Internet using an Ethernet cable. Click **Broadband Connection (Ethernet)** from the Network Connections screen to generate the “Broadband Connection (Ethernet) Properties” screen. This screen displays a list of the connection’s properties. The only modifications that can be made from this screen are disabling the connection (by clicking **Disable**) or renaming the connection (by entering a new name in the “Rule Name” text box).



Note: If disabling the connection, the Router must be rebooted for the change to take effect.

Configuring the Broadband Ethernet Connection

Click **Settings** at the bottom-right of the Broadband Connection (Ethernet) Properties window to generate the “Configure Broadband Connection (Ethernet)” screen.

Configure Broadband Connection (Ethernet)

NOTE: Only advanced technical users should use this feature.

General

Status: Down

When should this rule occur?: Always

Network: Broadband Connection

Connection Type: Ethernet

Physical Address: 00:0f:b3:a2:d7:c6

MTU: Automatic 1500

Internet Protocol Obtain an IP Address Automatically

Override Subnet Mask: 0.0.0.0

DHCP Lease: **Renew** **Release**

Expires In: 104 minutes

DNS Server Obtain DNS Server Address Automatically

IP Address Distribution Disabled

Routing Basic

Internet Connection Firewall Enabled

(This feature provides the ability to change the default firewall settings on this interface. We highly recommend that you not change the default settings.)

Additional IP Addresses **New IP Address**

Apply **Cancel**

General

The top part of the screen displays general communication parameters. We recommend not changing the default values in this section unless you are familiar with networking concepts.

Status Displays the status of the Ethernet connection (“Down,” “Connected,” etc.)

Schedule Displays when the rule is active. To configure rules, see the “Advanced Settings” chapter.

Network Select the type of connection being configured from the drop-down list (options: **Network (Home/Office)**, **Broadband Connection**, or **DMZ**).

Connection Type Displays the type of connection. Since this is an Ethernet Connection, “Ethernet” is displayed.

Physical Address Displays the physical address of the network card used for the network.

MTU MTU (Maximum Transmission Unit) specifies the largest packet size permitted for Internet transmission. “Automatic,” sets the MTU at 1500. Other choices include “Automatic by DHCP,” which sets the MTU according to the DHCP connection, and “Manual,” which allows the MTU to be set manually.

Internet Protocol

This section includes three options: **No IP Address**, **Obtain an IP Address Automatically**, and **Use the Following IP Address**.

No IP Address Select this option if the connection has no IP address. This is useful if the connection is operating under a bridge.

Obtain an IP Address Automatically Select this option if the ISP requires the connection to obtain an IP address automatically. The server assigning the IP address also assigns a subnet mask address, which can be overridden by clicking in the “Override Subnet Mask” check box and entering another subnet mask address. Additionally, the DHCP lease can be renewed and/or released by clicking on the appropriate “DHCP Lease” button. The “Expires In” value displays how long until the DHCP lease expires.

Use the Following IP Address Select this option if the connection uses a permanent (static) IP address. The ISP should provide this address, along with a subnet mask address, default gateway address, and, optionally, primary and secondary DNS server addresses.

DNS Server

The Domain Name System (DNS) is the method by which website or domain names are translated into IP addresses. This connection can be configured to automatically obtain a DNS server address, or such an address can be specified manually, according to the information provided by the ISP.

To configure the connection to automatically obtain a DNS server address, select **Obtain DNS Server Address Automatically** from the “DNS Server” drop-down list. To manually configure DNS server addresses, select **Use the Following DNS Server Addresses**. Specify up to two different DNS server addresses, one primary, the other secondary.

IP Address Distribution

The “IP Address Distribution” section of the Configure Broadband Connection (Ethernet) screen is used to configure the Router’s Dynamic Host Configuration Protocol (DHCP) server parameters. DHCP automatically assigns IP addresses to network devices. If enabled, make sure to configure the network devices as “DHCP Clients.” There are three options in this section: **Disabled**, **DHCP Server**, and **DHCP Relay**.



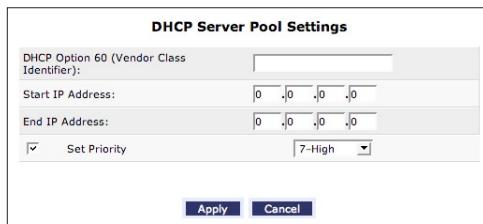
Caution: We strongly recommend leaving this setting at “Disabled.”

Disabled Select this option if statically assigning IP addresses to the network devices.

DHCP Server To set up the Router to function as a DHCP server:

1. Select **DHCP Server**.
2. Enter the IP address at which the Router starts issuing addresses in the “Start IP Address” text boxes. Since the Router’s default IP address is 192.168.1.1, the Start IP Address must be 192.168.1.2 or higher.
3. Enter the end of the IP address range used to automatically issue IP addresses in the “End IP Address” text boxes.
4. Enter the subnet mask address in the “Subnet Mask” text boxes. The subnet mask determines which portion of a destination LAN IP address is the network portion, and which portion is the host portion.
5. If a Windows Internet Naming Service (WINS) is being used, enter the WINS server address in the “WINS Server” text boxes.
6. Enter the amount of time a network device will be allowed to connect to the Router with its currently issued dynamic IP address in the “Lease Time in Minutes” text box. Just before the time is up, the device’s user will need to make a request to extend the lease or get a new IP address.
7. Click in the “Provide Host Name If Not Specified by Client” check box to have the Router automatically assign network devices with a host name, in case a host name is not provided by the user.

Additionally, to add a new product or product family, click **New IP Range** in the “Vendor Class ID” column below “IP Address Distribution According to DHCP Option 60 (Vendor Class Identifier).” This generates the “DHCP Server Pool Settings” screen. Set the device name, IP range, and priority level in the appropriate text boxes, then click **Apply**.



DHCP Relay Select this option to have the Router function as a DHCP relay. To enter a new IP address for the relay, click **New IP Address**. The “DHCP Relay Server Address” screen appears. Enter the new IP address in the appropriate text boxes, then click **Apply**.



Routing

The Router can be configured to use static or dynamic routing. Dynamic routing automatically adjusts how packets travel on the network, while static routing specifies a fixed routing path to neighboring destinations.

There are two options in the “Routing” section of the “Configure WAN Coax Link Ethernet” screen: **Basic** or **Advanced**.

Basic Select this option for basic routing operation.

Advanced To set up the Router’s Broadband Ethernet connection for advanced routing:

1. Select **Advanced** from the Routing drop-down menu.
2. Enter a device metric in the “Device Metric” text box. The device metric is a value used by the Router to determine whether one route is superior to another, considering parameters such as bandwidth and delay time.

3. Click in the “Default Route” check box to define this device as the default route.
4. Click in the “Multicast - IGMP Proxy Internal” check box to activate multicasting.

Routing Table

Clicking **New Route** generates the “New Route” window, where a new route can be configured.

Internet Connection Firewall

Click in the “Enabled” check box to activate the Router’s firewall on the connection.

Additional IP Addresses

Clicking **New IP Address** generates the “Additional IP Address Settings” screen, where additional IP addresses can be created to access the Router via the connection.

Coax Broadband Connection

A Coax Broadband connection connects the Router to the Internet using a coaxial cable. Click **Broadband Connection (Coax)** in the Network Connections screen to generate the “Broadband Connection (Coax) Properties” screen. This screen displays a list of the connection’s properties. The only modifications that can be made from this screen are disabling the connection (by clicking **Disable**) or renaming the connection (by entering a new name in the “Name” text box).

Broadband Connections (Coax) Properties	
NOTE: Only advanced technical users should use this feature.	
Disable	
Rule Name:	Broadband Connection (Coax)
Status:	Down
Network:	Broadband Connection
Connection Type:	Coax Link Ethernet
MAC Address:	00:0f:b3:a2:d7:cb
IP Address Distribution:	Disabled
Received Packets:	0
Sent Packets:	0
Time Span:	70:13:09
Channel:	Disconnected
Apply Cancel Settings	

 **Note:** If disabling the connection, the Router must be rebooted for the change to take effect.

Configuring the Coax Broadband Connection

Click **Settings** at the bottom of the Broadband Connection (Coax) Properties screen to generate the “Configure Broadband Connection (Coax)” screen.

Configure Broadband Connection (Coax)

NOTE: Only advanced technical users should use this feature.

General

Status:	Down
When should this rule occur?:	Always
Network:	Broadband Connection
Connection Type:	Coax
Physical Address:	00:0f:b3:a2:d7:c6
MTU:	Automatic 1500

Coax Link

Channel:	1-1000MHz
Auto Detection:	<input checked="" type="radio"/> On <input type="radio"/> Off
Privacy:	<input type="checkbox"/> Enabled
Password:	9999999998888888

WAN Coax Connection Speeds:

Router Tx(Mbps):	0
Router Rx(Mbps):	0

Internet Protocol

Obtain an IP Address Automatically
<input type="checkbox"/> Override Subnet Mask: <input type="text"/> .0 <input type="text"/> .0 <input type="text"/> .0
DHCP Lease: <input type="button" value="Renew"/> <input type="button" value="Release"/>

DNS Server

Obtain DNS Server Address Automatically

IP Address Distribution

Disabled

Routing

Basic

Internet Connection Firewall

<input checked="" type="checkbox"/> Enabled

(This feature provides the ability to change the default firewall settings on this interface. We highly recommend that you not change the default settings.)

Additional IP Addresses

New IP Address

General

The top part of the screen displays general communication parameters. We recommend not changing the default values in this section unless you are familiar with networking concepts.

Status Displays the status of the connection (“Down,” “Connected,” etc.).

When should this rule occur? Displays when the rule is active. To schedule rules, see the “Advanced Settings” chapter.

Network Displays the type of network to which the link is connected. Since this is a broadband connection (connected to the Internet), “Broadband Connection” is displayed.

Connection Type Displays the type of connection. Since this is a coaxial connection, “Coax” is displayed.

Physical Address Displays the physical address of the network card used for the network.

MTU MTU (Maximum Transmission Unit) specifies the largest packet size permitted for Internet transmission. “Automatic” sets the MTU at 1500. Other choices include “Automatic by DHCP,” which sets the MTU according to the DHCP connection, and “Manual,” which allows the MTU to be set manually.

Coax Link

Check and configure the coax link connection in this section of the screen.

Channel Displays the channel frequency range of the coaxial connection. This setting is not user configurable; it is for information only.

Privacy Toggle “Privacy” by clicking in the “Enabled” check box. If Privacy is activated, all devices connected via coaxial cable must use the same password. We recommend leaving the Privacy option deactivated.

Password Enter the Coax Link password here.

WAN Coax Connection Speeds

This section displays the Router’s Tx and Rx speeds (in Mbps).

Internet Protocol

This section includes three options: **No IP Address**, **Obtain an IP Address Automatically**, and **Use the Following IP Address**.

No IP Address Select this option if the connection has no IP address. This is useful when the connection is operating under a bridge.

Obtain an IP Address Automatically Select this option if the ISP requires the connection to obtain an IP address automatically. The server assigning the IP address also assigns a subnet mask address, which can be overridden by clicking in the “Override Subnet Mask” check box and entering another subnet mask address. Additionally, the DHCP lease can be renewed and/or released by clicking on the appropriate “DHCP Lease” button. The “Expires In” value displays how long until the DHCP lease expires.

Use the Following IP Address Select if the WAN connection is configured using a permanent (static) IP address. The ISP should provide this address, along with a subnet mask address, default gateway address, and, optionally, primary and secondary DNS server addresses.

DNS Server

Domain Name System (DNS) is the method by which website or domain names are translated into IP addresses. The connection can be set to automatically obtain a DNS server address, or an address can be set manually, according to information provided by the ISP.

To configure the connection to automatically obtain a DNS server address, select **Obtain DNS Server Address Automatically** from the “DNS Server” drop-down list. To manually configure DNS server addresses, select **Use the Following DNS Server Addresses**. Specify up to two different DNS server addresses, one primary, the other secondary.

IP Address Distribution

The “IP Address Distribution” section of the Configure Broadband Connection (Coax) screen allows the user to configure the Router’s Dynamic Host Configuration Protocol (DHCP) server parameters. The DHCP automatically assigns IP addresses to network devices. If enabled, make sure to configure the network devices as “DHCP Clients.” There are three options in this section: **Disabled**, **DHCP Server**, and **DHCP Relay**.



Caution: We strongly recommend leaving this setting at “Disabled.”

Disabled Select this option if statically assigning IP addresses to the network devices.

DHCP Server To set up the WAN Coax Link Ethernet connection to function as a DHCP server:

1. Select **DHCP Server**.
2. Enter the IP address at which the Router starts issuing addresses in the “Start IP Address” text boxes. Since the Router’s default IP address is 192.168.1.1, the Start IP Address must be 192.168.1.2.
3. Enter the end of the IP address range used to automatically issue IP addresses in the “End IP Address” text boxes.
4. Enter the subnet mask address in the “Subnet Mask” text boxes. The subnet mask determines which portion of a destination LAN IP address is the network portion, and which portion is the host portion.
5. If a Windows Internet Naming Service (WINS) is being used, enter the WINS server address in the “WINS Server” text boxes.
6. Enter the amount of time a network device will be allowed to connect to the Router with its currently issued dynamic IP address in the “Lease Time in Minutes” text box. Just before the time is up, the device’s user will need to make a request to extend the lease or get a new IP address.
7. Click in the “Provide Host Name If Not Specified by Client” check box to have the Router automatically assign network devices with a host name, in case a host name is not provided by the user.

DHCP Relay Select this option to have the Router function as a DHCP relay, and enter the IP address in the screen that appears.

Routing

The Router can be configured to use dynamic routing. Dynamic routing automatically adjusts how packets travel on the network. There are two options in the “Routing” section of the Configure Broadband Connection (Coax) screen: **Basic** or **Advanced**.



Warning: Do not use static routing unless instructed to do so by your ISP.

Basic Select this option for basic routing operation.

Advanced To set up the Router's Coax broadband connection for advanced routing:

1. Select **Advanced** from the Routing drop-down list.
2. Enter a device metric in the “Device Metric” text box. The device metric is a value used by the Router to determine whether one route is superior to another, considering parameters such as bandwidth and delay time.
3. Click in the “Default Route” check box to define this device as the default route.
4. Click in the “Multicast - IGMP Proxy Internal” check box to activate multicasting.

Routing Table

Click **New Route** to generate the “New Route” window, where a new route can be configured.

Additional IP Addresses

Click **New IP Address** to generate the “Additional IP Address Settings” screen, where additional IP addresses can be created to access the Router via the connection.

WAN PPPoE/WAN PPPoE 2

WAN Point-to-Point Protocol over Ethernet (PPPoE) relies on two widely accepted standards: Point-to-Point Protocol and Ethernet. PPPoE enables Ethernet networked computers to exchange information with computers on the Internet. PPPoE supports the protocol layers and authentication widely used in PPP and enables a point-to-point connection to be established in the normally multipoint architecture of Ethernet. A discovery process in PPPoE determines the Ethernet MAC address of the remote device in order to establish a session.

Click **WAN PPPoE** in the Network Connections screen to generate the “WAN PPPoE Properties” screen. This screen displays a list of the connection’s properties. The only modifications that can be made from this screen are disabling the connection (by clicking **Disable**) or renaming the connection (by entering a new name in the “Name” text box).

WAN PPPOE Properties

NOTE: Only advanced technical users should use this feature.

<input type="button" value="Enable"/>
Rule Name: <input type="text" value="WAN PPPOE"/>
Status: <input type="text" value="Disabled"/>
Network: <input type="text" value="Broadband Connection"/>
Underlying Device: <input type="text" value="Broadband Connection (Ethernet)"/>
Connection Type: <input type="text" value="PPPoE"/>
Service Name: <input type="text" value=""/>
User Name: <input type="text" value="verizonfios"/>

Configuring the WAN PPPoE Connection

Click **Settings** in the WAN PPPoE Properties screen to generate the “Configure WAN PPPoE” screen.

Configure WAN PPPoE

NOTE: Only advanced technical users should use this feature.

General

Status:	Disabled
When should this rule occur ?	Always
Network:	Broadband Connection ▾
Connection Type:	PPPoE
MTU:	Automatic ▾ 1492
Underlying Connection:	Broadband Connection (Ethernet) ▾

PPP

Service Name (should be filled only if specified by provider):	<input type="text"/>
<input type="checkbox"/> On Demand (will attempt to connect only when packets are sent)	
Time Between Reconnect Attempts:	30 Seconds

PPP Authentication

Login User Name (case sensitive):	verizonfios
Login Password:	*****
<input checked="" type="checkbox"/> Support Unencrypted Password (PAP)	
<input checked="" type="checkbox"/> Support Challenge Handshake Authentication (CHAP)	
<input checked="" type="checkbox"/> Support Microsoft CHAP (MS-CHAP)	
<input checked="" type="checkbox"/> Support Microsoft CHAP Version 2 (MS-CHAP v2)	

PPP Compression

BSD:	Allow ▾
Deflate:	Allow ▾

Internet Protocol

Override Subnet Mask:	0 . 0 . 0 . 0
DNS Server	Obtain DNS Server Address Automatically ▾

Routing

Internet Connection Firewall	Enabled
-------------------------------------	---------

(This feature provides the ability to change the default firewall setting on this interface. We highly recommend that you not change the default setting).

Buttons:

General

The top part of the Configure WAN PPPoE screen displays general communication parameters. We recommend not changing the default values in this section unless familiar with networking concepts.

Status Displays the connection status of the WAN PPPoE connection. (“Down,” “Disabled,” “Connected,” etc.)

When should this rule occur? Displays when the rule is active. To schedule rules, see “Advanced Settings” chapter.

Network Select the type of connection being configured from the drop-down list (**Broadband Connection**, **Network (Home/Office)**, or **DMZ**).

Connection Type Displays the type of connection. Since this is PPPoE connection, “PPPoE” is displayed.

MTU MTU (Maximum Transmission Unit) specifies the largest packet size permitted for Internet transmission. “Automatic,” sets the MTU at 1492. Other choices include “Automatic,” which sets the MTU according to the connection to the ISP, and “Manual,” which allows the MTU to be set manually.

Underlying Connection Specify the underlying connection above which the protocol initiates from the drop-down list, which displays all possible underlying devices.

PPP Configuration

Point-to-Point Protocol (PPP) is the most popular method for transporting packets between the user and the ISP.

Service Name Specify the networking peer’s service name, if provided by the ISP, in this text box.

On-Demand To use PPP on demand to initiate the point-to-point protocol session only when packets are actually sent over the Internet, click in this check box. This option should be active on a limited basis.

Idle Time Before Hanging Up Enter the amount of idle time, in minutes, before the PPP session automatically ends.

Time Between Reconnect Attempts In this text box, specify the duration between PPP reconnect attempts, as provided by the ISP.

PPP Authentication

Point-to-Point Protocol (PPP) currently supports four authentication protocols: **Password Authentication Protocol (PAP)**, **Challenge Handshake Authentication Protocol (CHAP)**, and **Microsoft CHAP versions 1 and 2**.

Select the authentication protocols the Router may use when negotiating with a PPTP server in this section. Select all the protocols if no information is available about the server’s authentication methods. Note that encryption is performed only if Microsoft CHAP, Microsoft CHAP version 2, or both are selected.



Warning: The PPP Authentication settings should not be changed unless instructed to do so by your ISP.

Login User Name Enter the user name (provided by the ISP) in this text box.

Login Password Enter the password (provided by the ISP) in this text box.

Support Unencrypted Password (PAP) Password Authentication Protocol (PAP) is a simple, plain-text authentication scheme. The user name and password are requested by the networking peer in plain-text. PAP, however, is not a secure authentication protocol. Man-in-the-middle attacks can easily determine the remote access client's password. PAP offers no protection against replay attacks, remote client impersonation, or remote server impersonation.

Support Challenge Handshake Authentication (CHAP) Click in this check box to activate CHAP, a challenge-response authentication protocol that uses MD5 to hash the response to a challenge. CHAP protects against replay attacks by using an arbitrary challenge string per authentication attempt.

Support Microsoft CHAP Click in this check box if communicating with a peer that uses Microsoft CHAP authentication protocol.

Support Microsoft CHAP Version 2 Select this check box if communicating with a peer that uses Microsoft CHAP Version 2 authentication protocol.

PPP Compression

The PPP Compression Control Protocol (CCP) is responsible for configuring, enabling, and disabling data compression algorithms on both ends of the point-to-point link. It is also used to signal a failure of the compression/ decompression mechanism in a reliable manner.

For each compression algorithm (**BSD** and **Deflate**), select one of the following from the drop-down list:

Reject Selecting this option rejects PPP connections with peers that use the compression algorithm. If Reject is activated, throughput may diminish.

Allow Selecting this option allows PPP connections with peers that use the compression algorithm.

Require Selecting this option insures a connection with a peer using the compression algorithm.

Internet Protocol

Select one of the following Internet Protocol options from the “Internet Protocol” drop-down list:

Obtain an IP Address Automatically This option is selected by default. Change only if required by the ISP. The server that assigns the Router with an IP address also assigns a subnet mask. Override the dynamically assigned subnet mask by selecting the “Override Subnet Mask” and entering a different subnet mask.

Use the Following IP Address Select this option to configure the Router to use a permanent (static) IP address. The ISP should provide this address.

DNS Server

The Domain Name System (DNS) is the method by which website or domain names are translated into IP addresses. The Router can be configured to automatically obtain a DNS server address, or the address can be entered manually, according to the information provided by the ISP.

To configure the connection to automatically obtain a DNS server address, select **Obtain DNS Server Address Automatically** from the “DNS Server” drop-down list. To manually configure DNS server addresses, select **Use the Following DNS Server Addresses** from the “DNS Server” drop-down list. Up to two different DNS server addresses can be entered (Primary and Secondary).

Routing

Select **Advanced** or **Basic** from the “Routing” drop-down list. If Advanced is selected, additional options appear, as listed below.

Routing Mode Select one of the following Routing modes:

- **Route** - Select this option to cause the Router to act as a router between two networks.
- **NAT** - Select this option to activate Network Address Translation (NAT), which translates IP addresses to a valid, public address on the Internet. NAT adds security, since the IP addresses of the devices on the network are not transmitted over the Internet. In addition, NAT allows many addresses to exist behind a single valid address. Use the NAT routing mode only if the local network consists of a single device, or collisions may occur if more than one device attempts to communicate using the same port.

- **NAPT** - Select this option to activate NAPT (Network Address and Port Translation), which refers to network address translation involving the mapping of port numbers and allows multiple machines to share a single IP address. Use NAPT if the local network contains multiple devices, a topology that necessitates port translation in addition to address translation.

Device Metric The device metric is a value used by the Router to determine whether one route is superior to another, considering parameters such as bandwidth, delay, and more.

Default Route Click in this check box to define the connection as a the default route.

Multicast - IGMP Proxy Default Click in this check box to enable the Router to issue IGMP (Internet Group Management Protocol) host messages on behalf of hosts the Router discovers through standard IGMP interfaces. IGMP proxy enables the routing of multicast packets according to the IGMP requests of local network devices asking to join multicast groups.

Routing Table

Clicking **New Route** generates the “New Route” window, where a new route can be configured.

Internet Connection Firewall

Click in the “Enabled” check box to activate the Router’s firewall on the WAN PPPoE connection.

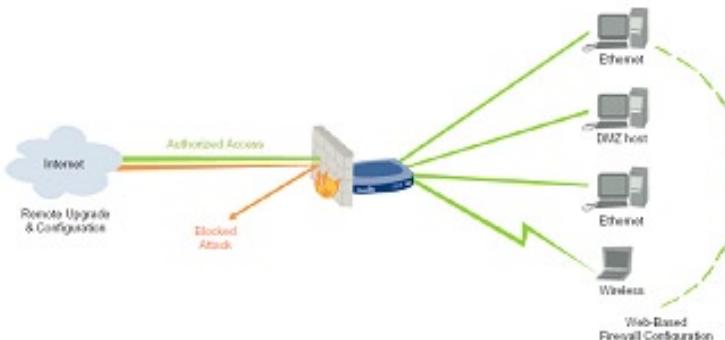
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Configuring the Router's Security

6

The Wireless Broadband Router's security suite includes comprehensive and robust security services: Stateful Packet Inspection, a firewall, user authentication protocols, and password protection mechanisms. These features allow users to connect their computers to the Internet and be protected from the security threats.

The Router's firewall is the cornerstone of the Router's security suite. It has been exclusively tailored to the needs of the residential/office user and is pre-configured to provide optimum security.



The firewall provides both the security and flexibility home and office users seek. It provides a managed, professional level of network security while enabling the safe use of interactive applications, such as Internet gaming and video-conferencing.

Additional features, including surfing restrictions and access control, can also be configured locally through the Router's MegaControl Panel, or remotely by a service provider.

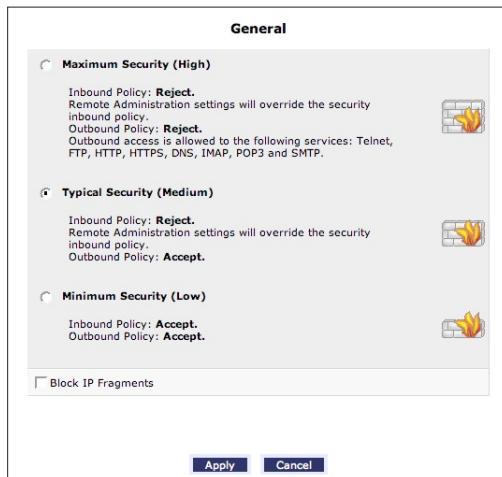
The firewall also supports advanced filtering, designed to allow comprehensive control over the firewall's behavior. Specific input and output rules can be defined, the order of logically similar sets of rules can be controlled, and distinctions between rules that apply to Internet and local network devices can be made.

This chapter covers these Security features:

- **General** - select the security level for the firewall.
- **Access Control** - restrict access from the local network to the Internet.
- **Port Forwarding** - enable access from the Internet to specified services provided by computers on the local network.
- **DMZ Host** - configure a network host to receive all traffic arriving at the Router which does not belong to a known session.
- **Port Triggering** - define port triggering entries to dynamically open the firewall for some protocols or ports.
- **Remote Administration** - enable remote configuration of the Router from any Internet-accessible computer.
- **Website Blocking** - block network access to a certain hosts or websites on the Internet.
- **Static NAT** - allow multiple static NAT IP addresses to be designated to devices on the network.
- **Advanced Filtering** - control the firewall's settings and rules.
- **Security Log** - view and configure the security log.

General

The “General” screen is used to configure the Router’s basic security settings.



The firewall regulates the flow of data between the local network and the Internet. Both incoming and outgoing data are inspected and then either accepted (allowed to pass through the Router) or rejected (barred from passing through the Router) according to a flexible and configurable set of rules. These rules are designed to prevent unwanted intrusions from the outside, while allowing local network users access to required Internet services.

The firewall rules specify what types of services available on the Internet can be accessed from the local network and what types of services available in the local network can be accessed from the Internet. Each request for a service the firewall receives, whether originating in the Internet or from a computer in the local network, is checked against the firewall rules to determine whether the request should be allowed to pass through the firewall. If the request is permitted to pass, all subsequent data associated with this request (a “session”) will also be allowed to pass, regardless of its direction.

For example, when accessing a website on the Internet, a request is sent out to the Internet for this site. When the request reaches the Router, the firewall identifies the request type and origin (HTTP and a specific computer in the local network, in this case). Unless the Router is configured to block requests of this type from this computer, the firewall allows this request to pass out onto the Internet. When the website is returned from the web server, the firewall will associate it with this session and allow it to pass, regardless of whether HTTP access from the Internet to the local network is blocked or permitted.

Note that it is the origin of the request, not subsequent responses to this request, which determines whether a session can be established or not.

The Router features three pre-defined security levels: **Minimum**, **Typical**, and **Maximum**. The table below summarizes the behavior of the Router for each of the three security levels.

Security Level	Requests from the Internet (incoming traffic)	Requests from the local network (outgoing traffic)
Maximum Security	Blocked - No access to local network from Internet, except as configured in the Port Forwarding, DMZ host, and Remote Access screens.	Limited - Only commonly used services, such as web browsing and E-mail, are permitted.
Typical Security	Blocked - No access to local network from Internet, except as configured in the Port Forwarding, DMZ host, and Remote Access screens.	Unrestricted - All services are permitted, except as configured in the Access Control screen.
Minimum Security	Unrestricted - Permits full access from Internet to local network; all connection attempts permitted.	Unrestricted - All services are permitted, except as configured in the Access Control screen.

These services include Telnet, FTP, HTTP, HTTPS, DNS, IMAP, POP3 and SMTP.



Note: Some applications (such as some Internet messengers and Peer-To-Peer client applications) tend to use these ports if they cannot connect with their own default ports. When applying this behavior, these applications will not be blocked outbound, even at the Maximum Security level.

To configure the Router's security settings:

1. From the General screen, select a security level by clicking the appropriate radio button. Using the Minimum Security setting may expose the local network to significant security risks, and thus should only be used for short periods of time.

2. Check the “Block IP Fragments” box to protect the local network from a common type of hacker attack that uses fragmented data packets to sabotage the network. Note that VPN over IPSec and some UDP-based services make legitimate use of IP fragments. IP fragments must be allowed to pass into the local network to use these services.
3. Click **Apply** to save changes.

Access Control

Access control is used to block specific computers within the local network (or even the whole network) from accessing certain services on the Internet. For example, one computer can be prohibited from surfing the Internet, another computer from transferring files using FTP, and the whole network from receiving incoming E-mail.

Access control defines restrictions on the types of requests that can pass from the local network out to the Internet, and thus may block traffic flowing in both directions. In the E-mail example given above, computers in the local network can be prevented from receiving E-mail by blocking their outgoing requests to POP3 servers on the Internet.

Access control also incorporates a list of preset services in the form of applications and common port settings.

Allow or Restrict Services

To view and allow/restrict these services:

1. Select **Access Control** from the left side of any Security screen. The “Access Control” screen appears.

 **Note:** The “Allowed” section is only visible when the firewall is set to “Maximum.”

Access Control
Block Internet Services / Protocols like, E-mail or Internet access for any computer on your network.

Blocked				
Networked Computer / Device	Network Address	Protocols	Status	Action
Add				 

Allowed				
Networked Computer / Device	Network Address	Protocols	Status	Action
<input checked="" type="checkbox"/> Any	Any	DHCP - UDP 67-68 -> 67	Active	 
<input checked="" type="checkbox"/> Any	Any	DNS - TCP 53 -> 53 TCP 1024-65535 -> 53 UDP 53 -> 53 UDP 1024-65535 -> 53	Active	 
<input checked="" type="checkbox"/> Any	Any	IMAP - TCP Any -> 143	Active	 
<input checked="" type="checkbox"/> Any	Any	SMTP - TCP Any -> 25	Active	 
<input checked="" type="checkbox"/> Any	Any	POP3 - TCP Any -> 110	Active	 
<input checked="" type="checkbox"/> Any	Any	HTTPS - TCP Any -> 443	Active	 
<input checked="" type="checkbox"/> Any	Any	HTTP - TCP Any -> 80	Active	 
<input checked="" type="checkbox"/> Any	Any	FTP - TCP Any -> 21	Active	 
<input checked="" type="checkbox"/> Any	Any	Telnet - TCP Any -> 23	Active	 
Add				 

Buttons: [Apply](#) [Cancel](#) [Resolve Now](#) [Refresh](#)

2. Click **Add**. The “Add Access Control Rule” screen appears.

 **Note:** To block a service, click **Add** in the “Blocked” section of the Access Control screen. To allow outgoing traffic, click **Add** in the “Allowed” section of the screen.

Add Access Control Rule

Networked Computer / Device	Any
Protocol	ANY
When should this rule occur ?	Always

Buttons: [Apply](#) [Cancel](#)

3. If this access control rule applies to all networked devices, select “Any” from the “Networked Computer/Device” list box. If this rule applies to certain devices only, select “Specify Address” and click **Add**. Then, create and add a network object (for more details about adding network objects, see the “Advanced Settings” chapter of this manual).
4. Select the Internet protocol to be allowed or blocked from the “Protocol” drop-down list.
5. If the rule will be active all the time, select **Always** from the “When should this rule occur?” drop-down list. If the rule will only be active at certain times, select **Specify Schedule** and click **Add**. Then, add a schedule rule (for more details about schedule rules, see the “Advanced Settings” chapter of this manual).
6. Click **Apply** to save the changes. The Access Control screen will display a summary of the new access control rule.



Note: To block a service not included in the list, select **Specify Protocol** from the Protocol drop-down menu. The “Edit Service” screen appears. Define the service, then click **OK**. The service will then be automatically added to the top section of the “Add Access Control Rule” screen, and will be selectable.

An access control can be disabled and the service made available without having to remove the service from the Access Control table. This may be useful to make the service available temporarily, with the expectation that the restriction will be reinstated later.

- To temporarily disable an access control, clear the check box next to the service name.
- To reinstate the restriction at a later time, select the check box next to the service name.
- To remove an access restriction from the Access Control table, click **Remove** for the service. The service will be removed from the Access Control table.

Port Forwarding

In its default state, the Router blocks all external users from connecting to or communicating with the network, making it safe from hackers who may try to intrude on the network and damage it. However, the network can be exposed to the Internet in certain limited and controlled ways to enable some applications to work from the local network (game, voice, and chat applications, for example) and to enable Internet access to servers in the network. Port forwarding (sometimes referred to as local servers) supports both of these functions.

To grant Internet users access to servers inside the local network, each service provided, as well as the computer providing it, must be identified. To do this:

1. Select **Port Forwarding** from the left side of any Security screen. The “Port Forwarding” screen appears.

Port Forwarding
This feature enables applications(Games, Webcams, IM & Others) by opening a tunnel between remote(Internet) computers and a specific device port inside your local area network(LAN).

Networked Computer / Device	Network Address	Public IP Address	Protocols	WAN Connection Type	Status	Action
Add						

Apply **Cancel** **Resolve Now** **Refresh**

2. Click **Add**. The “Add Port Forwarding Rule” screen appears.

Add Port Forwarding Rule

Specify Public IP Address

Networked Computer / Device:	Specify Address <input type="button" value=""/>	<input type="button" value="Add"/>
Protocol:	Specify Protocol <input type="button" value=""/>	<input type="button" value="Add"/>
WAN Connection Type:	All Broadband Devices <input type="button" value=""/>	
Forward to Port:	Same as Incoming Port <input type="button" value=""/>	
When should this rule occur?	Always <input type="button" value=""/>	

Apply **Cancel**

3. Enter the local IP address or the host name of the computer providing the service in the “Networked Computer/Device” text box, or select them from the drop-down list. Note that only one local network computer can be assigned to provide a specific service or application.

4. Select the Internet protocol to be provided from the “Protocol” drop-down list. To see all options, select **All Services**.
5. Select a WAN connection type from the “WAN Connection Type” drop-down list. We recommend selecting **All Broadband Devices**.
6. To select a port to forward communications to (this is optional), select **Specify** from the “Forward to Port” drop-down list, then, in the text box that appears, enter the port number. If no port is identified, select **Same as Incoming Port**.
7. If this port will be active all the time, select **Always** from the “When should this rule occur?” drop-down list. If the rule will only be active at certain times, select **Specify Schedule** and click **Add**. Then, add a schedule rule (for more details about schedule rules, see the “Advanced Settings” chapter of this manual).
8. Click **Apply** to save the changes.

How many computers can use a service or play a game simultaneously? Well, the answer may be a bit confusing. All the computers on the network can behave as clients and use a specific service simultaneously. Being a client means the computer within the network initiates the connection; for example, a computer on the network can open an FTP connection with an FTP server on the Internet. But only one computer on the network can operate as a server and respond to requests from computers on the Internet (outside the local network).

DMZ (Demilitarized Zone) Host

The DMZ host feature allows one device on the network to operate outside the firewall. Designate a DMZ host:

- To use an Internet service, such as an online game or video-conferencing program, not present in the Port Forwarding list and for which no port range information is available.
- To expose one computer to all services without restriction or security.



Warning: A DMZ host is not protected by the firewall and may be vulnerable to attack. Designating a DMZ host may also put other computers in the local network at risk. When designating a DMZ host, consider the security implications and protect it if necessary.

To designate a local computer as a DMZ host:

1. Select **DMZ Host** from the left side of any Security screen. The “DMZ Host” screen appears.



2. Click in the “DMZ Host IP Address” check box, then enter the IP address of the computer to be designated as a DMZ host. Note that only one network computer can be a DMZ host at any time.
3. Click **Apply**.

Click in the “DMZ Host IP Address” check box again to disable the DMZ host.

Port Triggering

Port triggering can be used for dynamic port forwarding configuration. By setting port triggering rules, inbound traffic is allowed to arrive at a specific network host using ports different than those used for the outbound traffic. The outbound traffic triggers which ports inbound traffic is directed.

For example, a gaming server is accessed using UDP protocol on port 2222. The gaming server responds by connecting the user using UDP on port 3333 when starting gaming sessions. In this case, port triggering must be used, since it conflicts with the following default firewall settings:

- The firewall blocks inbound traffic by default.
- The server replies to the Router’s IP, and the connection is not sent back to the host, since it is not part of a session.

To resolve the conflict, a port triggering entry must be defined, which allows inbound traffic on UDP port 3333, only after a network host generated traffic to UDP port 2222. This results in accepting the inbound traffic from the gaming server, and sending it back to the network host which originated the outgoing traffic to UDP port 2222.

To use port triggering:

1. Select **Port Triggering** from the left side of any Security screen. The “Port Triggering” screen appears.

Port Triggering
Trigger opening of ports for incoming data.

NOTE: Only advanced technical users should use this feature

Protocol	Outgoing Trigger Ports	Incoming Ports to Open	Action
<input checked="" type="checkbox"/> L2TP - Layer Two Tunneling Protocol	UDP Any -> 1701	UDP Any -> Same as Initiating	
<input checked="" type="checkbox"/> TFTP - Trivial File Transfer Protocol	UDP 1024-65535 -> 69	UDP Any -> Same as Initiating	

Specify Protocol

2. Select either “Specify Protocol” or “Show All Services” from the drop-down list next to “Add.”
3. Click **Add**. An “Edit Service” screen appears.

Edit Service

Service Name:

Outgoing Trigger Ports

Protocol	Server Ports	Action
<input type="button" value="New Trigger Ports"/>		

Incoming Ports to Open

Protocol	Opened Ports	Action
<input type="button" value="New Opened Ports"/>		

4. Specify the port triggering entries by clicking **New Trigger Ports** and **New Opened Ports** and entering the protocol and protocol number in the succeeding screens. For example, to set up port triggering for the scenario laid out on the previous page, the service ports would be set to UDP and 2222, while the opened ports would be set to UDP and 3333.

Remote Administration

The Router can be accessed and controlled not only from within the local network, but also from the Internet using remote administration.

To access, select **Remote Administration** from the left side of any Security screen. The “Remote Administration” screen appears.

Remote Administration

 **Attention**
With Remote Administration enabled, your network will be a risk from outside attacks.

Allow Incoming Access to the Telnet Server

Using Primary Telnet Port (23)
 Using Secondary Telnet Port (8023)
 Using Secure Telnet over SSL Port (992)

Allow Incoming Access to the Broadband Router

Using Primary HTTP Port (80)
 Using Secondary HTTP Port (8080)
 Using Primary HTTPS Port (443)
 Using Secondary HTTPS Port (8443)

Diagnostic Tools

Allow Incoming ICMP Echo Requests (e.g. pings and ICMP traceroute queries)
 Allow Incoming UDP Traceroute Queries

Buttons

Apply **Cancel**

Telnet

Telnet is used to create a command-line session and gain access to all system settings and parameters using a text-based terminal. Select the Telnet port to be used by clicking in the appropriate check box, then click **Apply**.

MegaControl Panel

MegaControl Panel is used to obtain access to the Router's MegaControl Panel and gain access to all settings and parameters, using a web browser. Both secure (HTTPS) and non-secure (HTTP) access is available. Select the port to be used by clicking in the appropriate text box, then click **Apply**.



Note: Telnet and MegaControl Panel remote administration access may be used to modify or disable firewall settings. Local IP addresses and other settings can also be changed, making it difficult or impossible to access the Router from the local network. Therefore, remote administration access to Telnet or MegaControl Panel services should be activated only when absolutely necessary.

Diagnostic Tools

Diagnostic Tools are used for troubleshooting and remote system management by a user or the ISP.



Note: Encrypted remote administration is performed using a secure SSL connection, and requires an SSL certificate. When accessing the Router for the first time using encrypted remote administration, a warning appears regarding certificate authentication because the Router's SSL certificate is self-generated. When encountering this message under these circumstances, ignore it and continue. Even though this message appears, the self-generated certificate is safe, and provides a secure SSL connection.

Static NAT

This option allows multiple public addresses to be designated to devices on the network. Static NAT allows devices behind a firewall and configured with private IP addresses appear to have public IP addresses on the Internet. This allows an internal host, such as a web server, to have an unregistered (private) IP address and still be reachable over the Internet. To do this:

1. Select **Static NAT** from any Security screen. The “Static NAT” screen appears.

Static NAT

Static IP Mapping Table

ID	Networked Computer / Device	Public IP Address	WAN Connection Type	Status	Port Forwarding	Action
Add						

2. Click **Add**. The “Add Static NAT” screen appears.

Add Static NAT

Networked Computer / Device:	<input type="button" value="Specify Address"/> <input style="width: 100px;" type="text"/>
Public IP Address	<input style="width: 100px;" type="text"/> .0 .0 .0
WAN Connection Type:	<input type="button" value="All Broadband Devices"/>
<input type="checkbox"/> Enable Port Forwarding for Static NAT	

3. Enter the name of the computer to be used as the local host, or, to enter a specific IP address, select **Specify Address** from the “Networked Computer/Device” drop-down list and enter the IP address in the box on the right.
4. Enter a public IP address assigned by the ISP in the “Public IP Address” text box.
5. Select a connection from the “WAN Connection Type” drop-down list.
6. Select the protocol that needs to be accessible from the public IP address by clicking in the check box next to “Enable Port Forwarding for Static NAT,” then selecting a protocol from the drop-down menu. Use “Any” to pass all data. Click **Apply**, and **Apply** again.

Repeat these steps to add more static IP addresses from the network.

Advanced Filtering

Advanced filtering is designed to allow comprehensive control over the firewall's behavior. Specific input and output rules can be defined, the order of logically similar sets of rules controlled, and distinctions made between rules that apply to Internet and local network devices.

To access, select **Advanced Filtering** from any Security screen. The “Advanced Filtering” screen appears.

Advanced Filtering

NOTE: Only advanced technical users should use this feature.

Input Rule Sets: Manage all incoming traffic from the Internet

Rule ID	Source Address	Destination Address	Protocols	Operation	Status	Action
Initial Rules						Add
<input checked="" type="checkbox"/> 0	Any	192.168.1.1	Any	Drop	Active	
Add						

Network (Home/Office) Rules

<input checked="" type="checkbox"/> 0	Any	224.0.0.0 / 240.0.0.0	Any	Drop	Active	
Add						

Broadband Connection (Ethernet) Rules

<input checked="" type="checkbox"/> 0	Any	224.0.0.0 / 240.0.0.0	Any	Drop	Active	
Add						

Ethernet Rules

<input checked="" type="checkbox"/> 0	Any	224.0.0.0 / 240.0.0.0	Any	Drop	Active	
Add						

Coax Rules

<input checked="" type="checkbox"/> 0	Any	224.0.0.0 / 240.0.0.0	Any	Drop	Active	
Add						

Wireless Access Point Rules

<input checked="" type="checkbox"/> 0	Any	224.0.0.0 / 240.0.0.0	Any	Drop	Active	
Add						

WAN PPPOE Rules

<input checked="" type="checkbox"/> 0	Any	224.0.0.0 / 240.0.0.0	Any	Drop	Active	
Add						

WAN PPPOE 2 Rules

<input checked="" type="checkbox"/> 0	Any	224.0.0.0 / 240.0.0.0	Any	Drop	Active	
Add						

Final Rules

<input checked="" type="checkbox"/> 0	Any	224.0.0.0 / 240.0.0.0	Any	Drop	Active	
Add						

Output Rule Sets: Manage all outbound traffic to the Internet

Rule ID	Source Address	Destination Address	Protocols	Operation	Status	Action
Initial Rules						Add
<input checked="" type="checkbox"/> 0	Any	224.0.0.0 / 240.0.0.0	Any	Drop	Active	
Add						

Network (Home/Office) Rules

<input checked="" type="checkbox"/> 0	Any	224.0.0.0 / 240.0.0.0	Any	Drop	Active	
Add						

Broadband Connection Rules

<input checked="" type="checkbox"/> 0	Any	224.0.0.0 / 240.0.0.0	Any	Drop	Active	
Add						

Ethernet Rules

<input checked="" type="checkbox"/> 0	Any	224.0.0.0 / 240.0.0.0	Any	Drop	Active	
Add						

Coax Rules

<input checked="" type="checkbox"/> 0	Any	224.0.0.0 / 240.0.0.0	Any	Drop	Active	
Add						

Wireless Access Point Rules

<input checked="" type="checkbox"/> 0	Any	224.0.0.0 / 240.0.0.0	Any	Drop	Active	
Add						

WAN PPPOE Rules

<input checked="" type="checkbox"/> 0	Any	224.0.0.0 / 240.0.0.0	Any	Drop	Active	
Add						

WAN PPPOE 2 Rules

<input checked="" type="checkbox"/> 0	Any	224.0.0.0 / 240.0.0.0	Any	Drop	Active	
Add						

Final Rules

<input checked="" type="checkbox"/> 0	Any	224.0.0.0 / 240.0.0.0	Any	Drop	Active	
Add						

Buttons: [Apply](#) [Cancel](#) [Resolve Now](#) [Refresh](#)

Two sets of rules can be configured: input rules and output rules. Each set of rules comprises three subsets: initial rules, network devices rules, and final rules. These subsets determine the sequence by which the rules will be applied. Following is a description of the set ordering for inbound and outbound packets.

Inbound Packets - Input Rule Sets

- Initial rules
- All rules defined for the network device on which the packet is
- Local servers rules from the local server tab in the security screen
- Rules to accept all the packets on a device in case the firewall check box “Internet Connection Firewall” in the connection settings screen is unchecked
- Remote administration rules from the remote administration tab
- DMZ host rules from the DMZ tab
- Final rules

Outbound Packets - Output Rules Sets

- Initial rules
- All rules defined for the network device on which the packet is
- Rules to accept all the packets on a device in case the firewall check box “Internet Connection Firewall” in the connection settings screen is unchecked
- IP/hostname filtering rules and access control rules from the tabs in the security screen
- Final rules

There are numerous rules automatically inserted by the firewall in order to provide improved security and block harmful attacks.

To configure advanced filtering rules, click **Add** next to the rule title. The “Add Advanced Filter” screen appears.

The screenshot shows the 'Add Advanced Filter' configuration dialog box. It is divided into several sections: 'Matching' (Source Address: Any, Destination Address: Any, Protocol: Any), 'Operation' (radio buttons for Drop, Reject, Accept, and Accept Packet, each with a description and a small icon), 'Logging' (checkbox for Log Packets Matched by This Rule), and 'When should this rule occur?' (dropdown menu set to Always). At the bottom are 'Apply' and 'Cancel' buttons.

To add an advanced filtering rule, define the following rule parameters:

Matching

To apply a firewall rule, a match must be made between IP addresses or ranges and ports. Use the “Source Address” and “Destination Address” drop-down lists to define the coupling of source and destination traffic. Port matching will be defined when selecting protocols. For example, if the FTP protocol is selected, port 21 will be checked for matching traffic flow between the defined source and destination IPs.

Operation

This is where the action the rule will take is defined. Select one of the following radio buttons:

- **Drop** - Deny access to packets that match the source and destination IP addresses and protocol ports defined in “Matching.”
- **Reject** - Deny access to packets that match the source and destination IP addresses and protocol ports defined in upper section of the screen, and send an ICMP error or a TCP reset to the origination peer.

- **Accept** - Allow access to packets that match the source and destination IP addresses and protocol ports defined in upper section of the screen. The data transfer session will be handled using Stateful Packet Inspection (SPI).
- **Accept Packet** - Allow access to packets that match the source and destination IP addresses and protocol ports defined in upper section of the screen. The data transfer session will not be handled using Stateful Packet Inspection (SPI), so other packets that match this rule will not be automatically allowed access. This setting is useful when creating rules that allow broadcasting.

Logging

Click in this check box to add entries relating to this rule to the security log.

Scheduler (When should this rule occur?)

If advanced filtering needs to be active all the time, select “Always” from the “When should this rule occur?” drop-down list. If the rule will only be active at certain times select **Specify Schedule** and click **Add**. Then, add a schedule rule (for more details about schedule rules, see the “Advanced Settings” chapter of this manual)

Security Log

The security log displays a list of firewall-related events, including attempts to establish inbound and outbound connections, attempts to authenticate at an administrative interface (MegaControl Panel or Telnet terminal), firewall configuration, and system start-up.

To access the security log, select **Security Log** from any Security screen. The “Security Log” screen appears.



Security Log			
Time	Event	Event-Type	Details
Press the Refresh button to update the data.			
Jan 2 21:14:18 2003	Firewall Setup	Firewall internal	Firewall configuration succeeded
Jan 2 21:14:18 2003	Firewall Setup	Firewall internal	Starting firewall configuration
Jan 2 21:14:03 2003	Firewall Setup	Firewall internal	Firewall configuration succeeded
Jan 2 21:14:03 2003	Firewall Setup	Firewall internal	Starting firewall configuration
Jan 1 01:45:20 2003	WBM Login	User authentication success	Username: admin (repeated 17 times, last time on Jan 2 21:08:07 2003)
Jan 1 01:45:12 2003	WBM Login	User authentication failure	Invalid password. Username: admin
Jan 1 00:01:16 2003	WBM Login	User authentication	Username: admin (repeated 4 times, last time on Jan 1 00:01:16 2003)

Time

The time (based on the Router's date and time settings) the event occurred.

Event

There are five kinds of events listed in the system log:

- **Inbound Traffic** - a result of an incoming packet
- **Outbound Traffic** - a result of an outgoing packet.
- **Firewall Setup** - configuration message
- **WBM Login** - a user logged in to WBM
- **CLI Login** - a user logged in to the command line interface via Telnet

Event-Type

Displays a textual description of the event.

Details

The “Details” column displays more information about the packet or the event, such as protocol, IP addresses, ports, etc. The following are the available event types that can be recorded in the security log:

- **Firewall internal** - from the firewall internal mechanism, in case this event-type is recorded, an accompanying explanation will be added.
- **Firewall status changed** - the firewall changed status from up to down or the vice versa, as specified in the event type description.
- **STP packet** - an STP (Spanning Tree Protocol) packet has been accepted/rejected.
- **Illegal packet options** - the options field in the packet's header is either illegal or forbidden.
- **Fragmented packet** - a fragment has been rejected.
- **WinNuke protection** - a WinNuke attack has been blocked.
- **ICMP replay** - an ICMP (Internet Control Message Protocol) replay mes-

sage has been blocked.

- **ICMP redirect protection** - an ICMP redirected message has been blocked.
- **Packet invalid in connection** - an invalid connection packet has been blocked.
- **ICMP protection** - a broadcast ICMP message has been blocked.
- **Broadcast/Multicast protection** - a packet with a broadcast/multicast source IP has been blocked.
- **Spoofing protection** - a packet from the Internet with a source IP belonging to the local network has been blocked.
- **DMZ network packet** - a packet from a demilitarized zone network has been blocked.
- **Trusted device** - a packet from a trusted device has been accepted.
- **Default policy** - a packet has been accepted/blocked according to the default policy.
- **Remote administration** - a packet designated for the Router management has been accepted/blocked.
- **Access control** - a packet has been accepted/blocked because of an access control rule.
- **Parental control** - a packet has been blocked because of parental control.
- **NAT out failed** - NAT failed for this packet.
- **DHCP request** - the Router sent a DHCP request (depends on the distribution)
- **DHCP response** - the Router received a DHCP response (depends on the distribution)
- **DHCP relay agent** - a DHCP relay packet has been received (depends on the distribution)
- **IGMP packet** - an IGMP packet has been accepted.
- **Multicast IGMP connection** - a multicast packet has been accepted.
- **PPTP connection** - a packet inquiring whether the Router is ready to

receive a PPTP connection has been accepted.

- **AUTH:113 request** - an outbound packet for AUTH protocol has been accepted (for maximum security level).
- **IPv6 over IPv4** - an IPv6 over IPv4 packet has been accepted.
- **ARP** - an ARP packet has been accepted.
- **PPP Discover** - a PPP discover packet has been accepted.
- **PPP Session** - a PPP session packet has been accepted.
- **802.1Q** - a 802.1Q (VLAN) packet has been accepted.
- **Outbound Auth1X** - an outbound Auth1X packet has been accepted.
- **IP Version 6** - an IPv6 packet has been accepted.
- **Router initiated traffic** - all traffic the Router initiates is recorded.
- **Maximum security enabled service** - a packet has been accepted because it belongs to a permitted service in the maximum security level.
- **SynCookies Protection** - a SynCookies packet has been blocked.
- **ICMP Flood Protection** - a packet has been blocked, stopping an ICMP flood.
- **UDP Flood Protection** - a packet has been blocked, stopping a UDP flood.
- **Service** - a packet has been accepted because of a certain service, as specified in the event type.
- **Advanced Filter Rule** - a packet has been accepted/blocked because of an advanced filter rule.
- **Fragmented packet, header too small** - a packet has been blocked because, after defragmentation, the header was too small.
- **Fragmented packet, header too big** - a packet has been blocked because, after defragmentation, the header was too big.
- **Fragmented packet, bad align** - a packet has been blocked because, after defragmentation, the packet was badly aligned.

- **Fragmented packet, packet too big** - a packet has been blocked because, after defragmentation, the packet was too big.
- **Fragmented packet, packet exceeds** - a packet has been blocked because, after defragmentation, the packet exceeded.
- **Fragmented packet, no memory** - a fragmented packet has been blocked because there is no memory for fragments.
- **Fragmented packet, overlapped** - a packet has been blocked because, after defragmentation, there were overlapping fragments.
- **Defragmentation failed** - the fragment has been stored in memory and blocked until all fragments have arrived and defragmentation can be performed.
- **Connection opened** - debug message regarding connection.
- **Wildcard connection opened** - debug message regarding connection.
- **Wildcard connection hooked** - debug message regarding connection.
- **Connection closed** - debug message regarding connection.
- **Echo/Chargen/Quote/Snork protection** - a packet has been blocked due to Echo/Chargen/Quote/Snork protection.
- **First packet in connection is not a SYN packet** - a packet has been blocked due to a TCP connection that started without a SYN packet.
- **Error : No memory** - a new connection has not been established because of lack of memory.
- **NAT Error : connection pool is full. No connection created** - a connection has not been created because the connection pool is full.
- **NAT Error: No free NAT IP** - no free NAT IP, so NAT has failed.
- **NAT Error: Conflict Mapping already exists** - a conflict occurred because the NAT mapping already exists, so NAT failed.
- **Malformed packet: Failed parsing** - a packet has been blocked because it is malformed.
- **Passive attack on ftp-server: Client attempted to open Server ports** - a packet has been blocked.

- **FTP port request to 3rd party is forbidden (Possible bounce attack)** - a packet has been blocked.
- **Firewall Rules were changed** - the firewall rule set has been modified.
- **User authentication** - a message arrived during login time, including both successful and failed authentication.

Security Log Settings

To view or change the security log settings:

1. Click **Settings** in the Security Log screen. The “Security Log Settings” screen appears.

The screenshot shows the 'Security Log Settings' configuration window. It is divided into several sections:

- Accepted Events**: Contains two checkboxes: Accepted Incoming Connections and Accepted Outgoing Connections.
- Blocked Events**: Contains a grid of checkboxes for various types of blocked events. The columns are: Winnuke, Defragmentation Error, Blocked Fragments, Syn Flood, Echo Charger, Multicast/Broadcast, Spoofed Connection, Packet Illegal Options, UDP Flood, and ICMP Replay, ICMP Redirect, ICMP Multicast, and ICMP Flood.
- Other Events**: Contains two checkboxes: Remote Administration Attempts and Connection States.
- Log Buffer**: Contains a checkbox: Prevent Log Overrun.

At the bottom are 'Apply' and 'Cancel' buttons.

2. Select the type of activities that will generate a log message:
 - **Accepted Incoming Connections** - activating this check box generates a log message for each successful attempt to establish an inbound connection to the local network.
 - **Accepted Outgoing Connections** - activating this check box generates a log message for each successful attempt to establish an outgoing connection to the public network.

3. Select the type of blocked events to be listed in the log:
 - **All Blocked Connection Attempts** - activating this check box generates log messages for all blocked events.
 - **Other Blocked Events** - if “All Blocked Connection Attempts” is un-checked, select specific blocked events from this list to generate log messages.
4. Click in the “Remote Administration Attempts” check box to write a log message for each remote-administration connection attempt, whether successful or not.
5. Click in the “Connection States” check box to track connection handling by the firewall and Application Level Gateways (ALGs).
6. Click **Apply** to save changes.

Using Parental Controls

7

The abundance of harmful information on the Internet poses a serious challenge for employers and parents alike - “How can I regulate what my employee/child does on the Internet?” The Wireless Broadband Router’s Parental Controls allows users to regulate, control, and monitor Internet access. By classifying and categorizing online content, it is possible to create numerous Internet access policies and easily apply them to networked computers.

Activating Parental Controls

To create a basic access policy for a computer on the Router’s network, click **Parental Control** from the top of the Home screen and follow these instructions:

1. The “Parental Control” screen appears. Click in the “Enable” check box to activate the access policy mechanism.
2. Enter a “Rule Name” and “Description” for the access policy in the appropriate text boxes.

Parental Control

Parental Control provides the ability to create specific rules to Block or Allow any Website and URL keywords which can be assigned to a single or group of computers / devices on your network.
To setup Parental Control, simply follow the steps below.

Step 1. To enable Parental Control, click the "Enable" box below.

Enable

Step 2. Create a Rule Name and Description.

Rule Name

Description

3a. Click the circle next to “Block the following Websites” to block access to a list of websites, or click the circle next to “Allow the following Websites” to allow access to a list of websites.

3b. Enter the URL of the websites to be included on the list in the text box below. For example, enter “www.sample.com.”

Step 3. Choose to Block or Allow access to a Website and URL keyword.

Block the following Websites
 Allow the following Websites

Specify a list of Websites separated by spaces. Example www.sample.com

Block the following URL Keywords
 Allow the following URL Keywords

Specify a list of URL Keywords separated by spaces.
Note: URL keywords are any words that can be included in a website address such as "example" in www.example.com

Step 4. Click the Apply button for the settings to take effect.

Apply **Cancel**

3c. Additionally, the Router can block or allow access to websites based on “keywords.” For example, to block any website with “example” in its title, click in the circle next to “Block the Following URL Keywords,” then enter “example” in the text box below. To allow access to any website with “example” in its title, click in the circle next to “Allow the Following URL Keywords,” then enter “example” in the text box.

4. When finished, click **Apply** to have the access policy take effect.

- 5a. Select the computer or device on the network on which the access policy will be enforced from the “Network Computer/Device” drop-down menu.
- 5a. Select the time period during which the access policy will be enforced from the “Network Computer/Device” drop-down menu. If “Specify Schedule” is selected, see “Scheduler Rules” in the “Advanced Settings” chapter for more information.
6. An overview of the rule (or access policy) is displayed at the bottom of the screen.

Step 5. Select the Network Computer/Device, the rule will apply to.

Rule Name:	Network Computer / Device:	Any
When should this rule occur ?	Always	

Rule Overview:

Rule Name	Description	Action

Networked Computer/Device Overview:

Computer/Device	IP Address	Rule	When should this rule occur?	Action

Advanced Parental Controls

Clicking Advanced from the menu on the left side generates the “Advanced” screen.

Advanced

To block All Internet access to a specific computer/device on your network, follow the steps below.

Step 1. Select the Computer/Device, that blocking All Internet access will apply to.

Network Computer / Device:	Any
When should this rule occur ?	Always

Step 2. Click the Apply button for the settings to take effect.

Apply **Cancel**

Overview:

Blocked Device	Delete Rule
	
	

Here, all Internet access to a particular computer or device on the network can be blocked. To do this:

1. Select the computer or device on the network on which the access policy will be enforced from the “Network Computer/Device” drop-down menu.

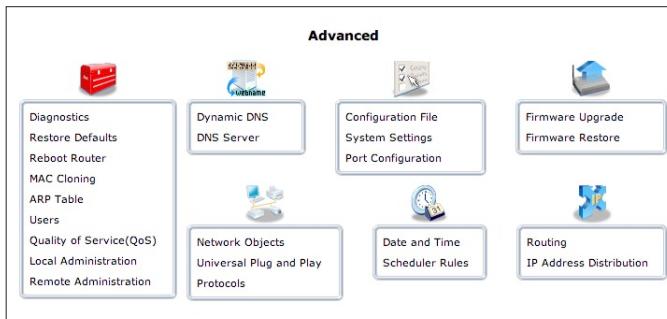
2. Select the time period during which the access policy will be enforced from the “Network Computer/Device” drop-down menu. If “Specify Schedule” is selected, see “Scheduler Rules” in the “Advanced Settings” chapter for more information.
3. When finished, click **Apply** to have the access policy take effect.
4. An overview of the rule (or access policy) is displayed at the bottom of the screen.

Using Advanced Settings

8

The “Advanced” section of the Wireless Broadband Router’s MegaControl Panel is intended primarily for more advanced users. Some changes to settings within this section could adversely affect the operation of the Router and the local network, and should be made with caution.

To access the Router’s Advanced Settings, click **Advanced** at the top of the Home screen, which generates the “Advanced” screen.



The following settings are explained in this chapter:

Firmware Upgrade - download and install new versions of the Router’s firmware

Firmware Restore - restores firmware to previous version loaded in flash memory

Configuration File - manage configuration files

System Settings - modify the system’s settings

Date and Time - set the local date and time

Scheduler Rules - schedule firewall activation

Routing - manage routing policies

IP Address Distribution - manage the IP addresses of devices on the network

Diagnostics - perform diagnostic tests on the Router

Restore Defaults - reset the Router to its default settings

Reboot Router - restart the Router

MAC Cloning - clone MAC addresses

ARP Table - display active devices and their IP and MAC addresses, etc.

Users - create and manage remote users

Local Administration - configure and manage local administration policies

Dynamic DNS - configure Dynamic DNS settings

DNS Server - manage the local (LAN) network for host name and IP address

Network Objects - create and manage network objects (discrete LAN subsets)

Universal Plug and Play - configure Universal Plug and Play settings

Protocols - manage and create open ports for various Internet protocols or customize an application

About - view information about the Router

Radius - manage the RADIUS (Remote Authentication Dial-in User Service) server

Remote Administration is explained in the “Security” chapter of this manual.

QoS is explained in Appendix A of this manual.

Firmware Upgrade

The Router offers a built-in mechanism for upgrading its firmware without losing custom configurations and settings. There are two methods for upgrading the firmware:

- **Upgrading from a local computer** - use a software image file pre-downloaded to the computer's disk drive or located on the accompanying evaluation CD.
- **Upgrading from the Internet** - use this method to upgrade the Router's firmware by remotely downloading an updated software image file.

Upgrading From a Local Computer

To upgrade from a local computer:

1. Click **Firmware Upgrade** from the Advanced screen. The “Firmware Upgrade” screen appears.



2. In the “Upgrade From a Computer in the Network” section, click **Upgrade Now**. The “Upgrade From a Computer in the Network” screen appears.



3. Enter the path of the software image file, or press the “Browse” button to browse for the file, and click **Apply**. Make sure to only use files with an “rmt” extension when performing the firmware upgrade procedure.
4. When loading is completed, a confirmation screen appears, asking whether to upgrade to the new version. Click **Apply**. The upgrade process begins and should take no longer than one minute to complete.

At the conclusion of the upgrade process the Router automatically reboots. The new firmware will run, maintaining any custom configurations and settings.

Upgrading From the Internet

The Router’s firmware can be automatically updated via the Internet. From the drop-down list next to the globe icon near the top of the Firmware Upgrade screen, a list of options appears, as described below.

Automatically Check and Upgrade

If “Automatically Check for New Version and Upgrade Wireless Broadband Router” is selected, enter the period of time the Router checks for a new upgrade, and the URL at which to get the upgrade, in the appropriate text boxes. The Router will then check at each time interval for upgrades and, if one is available, upgrade the Router’s firmware.

Automatically Check and Send E-mail

If “Automatically Check for New Version and Notify via Email” is selected, enter the period of time the Router checks for a new upgrade, and the URL at which to get the upgrade, in the appropriate text boxes. The Router will then check at each time interval for firmware upgrades and, if one is available, send an E-mail to the E-mail address listed in the System Settings.

Automatic Check Disabled

If “Automatically Check Disabled” is selected, the Router will not automatically check for firmware upgrades.

Manual Checking and Upgrading

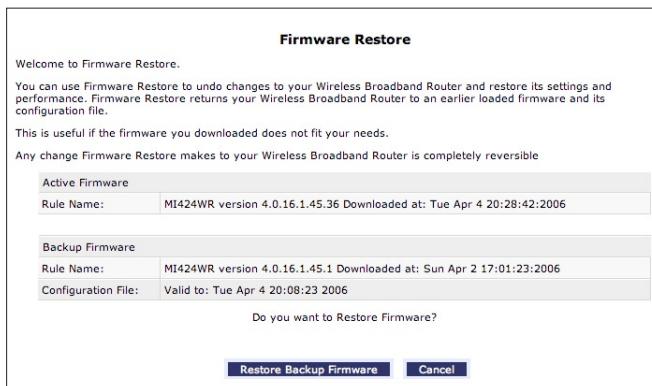
To manually upgrade the Router’s firmware:

1. Click **Check Now** in the Firmware Upgrade screen.
2. If a new version is available, click **Force Upgrade**. A download process will begin. When downloading is completed, a confirmation screen appears, asking whether to upgrade to the new version.
3. Click **Apply**. The upgrade process will begin and should take no longer than one minute to complete.

At the conclusion of the upgrade process the Router automatically reboots. The new firmware runs, maintaining any custom configurations and settings.

Firmware Restore

Firmware restore allows the Router’s firmware to return to an earlier version, if the current version is unstable or does not meet specified needs. Click **Firmware Restore** from the Advanced screen to generate the “Firmware Restore” screen.

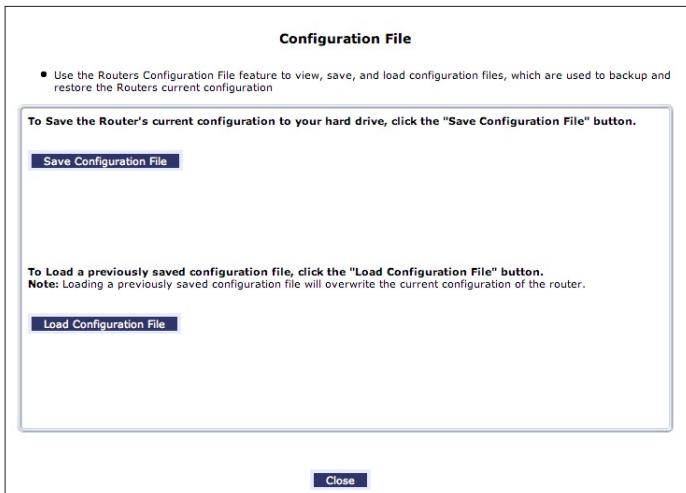


The screen displays the “Active Firmware” and the “Backup Firmware.” To restore the firmware to the backup firmware, click **Restore Backup Firmware**. A confirmation screen appears. Click **OK** to finish restoring the Router’s firmware.

Configuration File

Use the Router's Configuration File feature to view, save, and load configuration files, which are used to backup and restore the Router's current configuration: To do this:

1. Click **Configuration File** in the Advanced screen. The "Configuration File" screen appears.



2. Click **Load Configuration File** to load the previous configuration from a file and restart the Router.
3. Click **Save Configuration File** to backup the current configuration to a file.

System Settings

Clicking **System Settings** in the Advanced screen generates the “System Settings” screen, where various system and management parameters can be configured.

System Settings

System

Wireless Broadband Router's Hostname:	Wireless_Broadband_Route
Local Domain:	home

Wireless Broadband Router

<input checked="" type="checkbox"/> Automatic Refresh of System Monitoring Web Pages
<input checked="" type="checkbox"/> Warn User Before Network Configuration Changes

Session Lifetime: 600 Seconds

Configure a number of concurrent users that can be logged into the Router: 5

Remote Administration

Management Application Ports

Primary HTTP Management Port:	80
Secondary HTTP Management Port:	8080
Primary HTTPS Management Port:	443
Secondary HTTPS Management Port:	8443
Primary Telnet Port:	23
Secondary Telnet Port:	8023
Secure Telnet over SSL Port:	992

System Logging

<input checked="" type="checkbox"/> Enable Logging
<input checked="" type="checkbox"/> Low Capacity Notification Enabled

Allowed Capacity Before Email Notification: 80 %

System Log Buffer Size: 16 KB

Remote System Notify Level: None

Security Logging

<input checked="" type="checkbox"/> Enable Logging
<input checked="" type="checkbox"/> Low Capacity Notification Enabled

Allowed Capacity Before Email Notification: 80 %

Security Log Buffer Size: 16 KB

Remote Security Notify Level: None

Outgoing Mail Server

Server:	
From Email Address:	
Port:	25
<input type="checkbox"/> Server Requires Authentication	

Auto WAN Detection

<input checked="" type="checkbox"/> Enable Logging	
PPP Timeout:	30 Seconds
DHCP Timeout:	30 Seconds
Number of Cycles:	2
<input checked="" type="checkbox"/> Auto Detection Continuous Trying	

Buttons

Apply Cancel

System

Use the “System” section of this screen to configure the following two options:

Wireless Broadband Router’s Hostname

Specify the Router’s host name by entering it into the this text box. The host name is also the Router’s URL address, so it can be entered here rather than 192.168.1.1.

Local Domain

Specify the network’s local domain by entering it into this text box.

Wireless Broadband Router

Use this section to configure the following:

Automatic Refresh of System Monitoring Web Pages

Click in this check box to activate the automatic refresh of system monitoring web pages.

Warn User Before Network Configuration Changes

Click in this check box to activate user warnings before network configuration changes take effect.

Session Lifetime

After the Router has been inactive for a period of time, the user must reenter a user name and password to continue accessing the MegaControl Panel. To change the length of this time period, enter the amount of time (in seconds) in the “Session Lifetime” text box.

Configure a number of concurrent users...

Used to limit the number of users that can access the Router at the same time. Select the number of users from the drop-down list.

Management Application Ports

This section allows the following management application ports to have their default port numbers to be changed:

- Primary/secondary HTTP ports
- Primary/secondary HTTPS ports
- Primary/secondary Telnet ports
- Secure Telnet over SSL ports

System Logging

Use this section to configure the following system log options.

Enable Logging

Click in this check box to activate system logging.

Low Capacity Notification Enabled

Click in this check box to activate low capacity notification (works in tandem with “Allowed Capacity Before Email Notification” and “System Log Buffer Size” options).

Allowed Capacity Before Email Notification

Enter the percentage of system log buffer capacity reached to trigger an E-mail notification.

System Log Buffer Size

Enter the size of the system log buffer in this text box.

Remote System Notify Level

This feature is used to specify the type of information received for remote system logging. Options include **None**, **Error**, **Warning**, and **Information**.

Security Logging

Use this section to configure the following security log options.

Enable Logging

Click in this check box to activate security logging.

Low Capacity Notification Enabled

Click in this check box to activate low capacity notification (works in tandem with “Allowed Capacity Before Email Notification” and “Security Log Buffer Size” options).

Allowed Capacity Before Email Notification

Enter the percentage of security log buffer capacity reached to trigger an E-mail notification.

Security Log Buffer Size

Enter the size of the security log buffer in this text box.

Remote System Notify Level

This feature is used to specify the type of information received for security logging. Options include **None**, **Error**, **Warning**, and **Information**.

Outgoing Mail Server

Use this section to configure the outgoing mail server options. This server is used format and send system and security log E-mail notifications.

Server

Enter the host name of the outgoing (SMTP) server in this text box.

From Email Address

E-mail notifications require a “from” address. Enter a “from” E-mail address in this text box.

Port

Enter the port number of the E-mail server in this text box.

Server Requires Authentication

If the E-mail server requires authentication, click in this check box, then enter a user name and password in the “User Name” and “Password” text boxes that appear.

Auto WAN Detection

When activated, Auto WAN Detection causes the Router to automatically search for a WAN connection.

Enable Logging

Clicking in this check box activates automatic WAN detection.

PPP Timeout

Enter the amount of time (in seconds) before the Router stops attempting to establish a broadband PPP connection.

DHCP Timeout

Enter the amount of time (in seconds) before the Router stops attempting to establish a broadband DHCP connection.

Number of Cycles

Enter the number of times the Router attempts to detect a broadband PPP and DHCP connection.

Auto Detection Continuous Trying

Click in this check box to cause the Router to indefinitely search for a broadband connection.

Date and Time

To configure date, time, and daylight savings time settings perform the following:

1. Click **Date and Time** in the Advanced screen. The “Date and Time” screen appears.

Date and Time

Localization

Local Time:	Jan 1, 2003 21:26:10
Time Zone:	Eastern Time (GMT-05:00)

Daylight Saving Time

<input checked="" type="checkbox"/> Enabled	
Start:	Mar 28 00:00
End:	Oct 28 01:00
Offset:	60 Minutes

Automatic Time Update

<input checked="" type="checkbox"/> Enabled		
<input type="radio"/> Time Of Day (TOD)		
<input checked="" type="radio"/> Network Time Protocol (NTP)		
Update Every:	24 Hours	Sync Now
Time Server	Action	
ntp.actiontec.com		
Add		
Status:	Got time update from server, Last Update: Fri Apr 14 13:27:45 2006	

Press the **Refresh** button to update the status.

Buttons: Apply, Cancel, Clock Set, Refresh

2. Select the local time zone from the drop-down list. The Router can automatically detect daylight saving setting for selected time zones. If the daylight saving settings for a time zone are not automatically detected, the following fields will be displayed:
 - **Enabled** - Select this check box to enable daylight saving time.
 - **Start** - Date and time when daylight saving starts.
 - **End** - Date and time when daylight saving ends.
 - **Offset** - The time amount daylight saving time changes.

To perform an automatic time update:

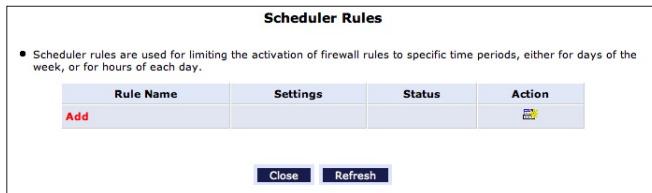
1. Click in the “Enabled” check box in the “Automatic Time Update” section.
2. Select the protocol to be used to perform the time update by selecting either the “Time of Day” or “Network Time Protocol” radio button.
3. Specify how often to perform the update in the “Update Every” text box.
4. Define time server addresses by clicking **Add** on the bottom of the “Automatic Time Update” section and entering the IP address or domain name of the time server in the “Time Server Settings” screen.

Scheduler Rules

Scheduler rules are used for limiting the activation of firewall rules to specific time periods, either for days of the week, or for hours of each day.

To define a rule:

1. Make sure the Router’s date and time are set correctly. To do this, see the “Date and Time” section in this chapter.
2. Click **Scheduler Rules** in the Advanced screen. The “Scheduler Rules” screen appears.



3. Click **Add**. The “Set Rule Schedule” screen appears.



The “Set Rule Schedule” screen is a configuration window. At the top, it displays the title “Set Rule Schedule”. Below the title, there is a “Rule Name” field containing the text “Scheduler Rule”. Under the “Rule Settings” section, there are two radio buttons: “Rule will be active at the scheduled time.” (which is selected) and “Rule will be inactive at the scheduled time.”. A table below is titled “Rule Schedule” and contains a single row with the text “Add Rule Schedule”. To the right of the table is an “Action” column with a small icon. At the bottom of the screen are two buttons: “Apply” and “Cancel”.

4. Enter a name for the rule in the “Rule Name” text box.

5. Specify if the rule will be active or inactive during the designated time period by clicking the appropriate “Rule Settings” radio button.

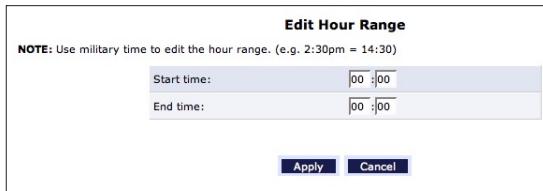
6. Click **Add Rule Schedule**. The “Edit Rule Schedule” screen appears.



The “Edit Rule Schedule” screen is a configuration window. At the top, it displays the title “Edit Rule Schedule”. Below the title, there is a “Days of Week” section containing checkboxes for each day of the week: Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, and Sunday. A table below is titled “Hours Range” and contains a single row with the text “New Hours Range Entry”. To the right of the table is an “Action” column with a small icon. At the bottom of the screen are two buttons: “Apply” and “Cancel”.

7. Select or active or inactive days of the week by clicking in the appropriate text boxes.

8. If applicable, click **New Hours Range Entry** to define an active/inactive hourly range. The “Edit Hour Range” screen appears. Enter a start and end time in the appropriate text boxes.



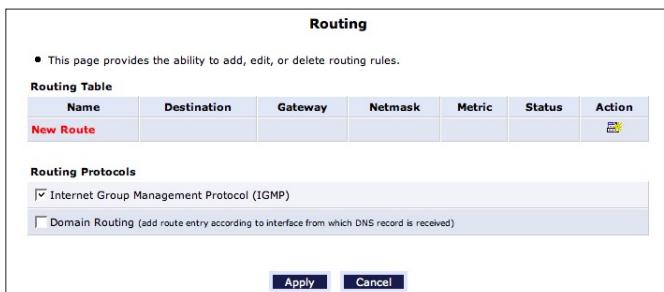
The dialog box is titled “Edit Hour Range”. It contains a note: “NOTE: Use military time to edit the hour range. (e.g. 2:30pm = 14:30)”. Below the note are two text input fields: “Start time:” with the value “00 :00” and “End time:” with the value “00 :00”. At the bottom are “Apply” and “Cancel” buttons.

9. Click **Apply**.

 **Note:** Make sure the Router’s date and time settings are properly configured for the time zone.

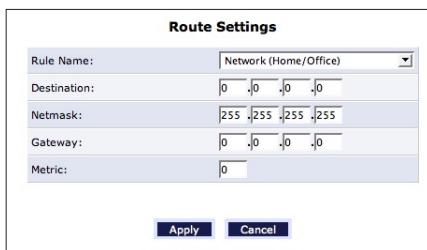
Routing

Access the routing table rules by clicking **Routing** in the Advanced screen. The “Routing” screen appears.



The screen is titled “Routing”. It contains a note: “This page provides the ability to add, edit, or delete routing rules.” Below is a “Routing Table” table with columns: Name, Destination, Gateway, Netmask, Metric, Status, and Action. A row for “New Route” is selected. Under “Routing Protocols”, “Internet Group Management Protocol (IGMP)” is checked, and “Domain Routing (add route entry according to interface from which DNS record is received)” is unchecked. At the bottom are “Apply” and “Cancel” buttons.

Routing rules can be added, edited, or deleted from the Routing screen. To add a router, click **New Route**. The “Route Settings” screen appears.



The dialog box is titled “Route Settings”. It contains fields for “Rule Name” (set to “Network (Home/Office)”), “Destination” (0.0.0.0), “Netmask” (255.255.255.255), “Gateway” (0.0.0.0), and “Metric” (0). At the bottom are “Apply” and “Cancel” buttons.

When adding a routing rule, the following parameters must be specified:

- **Rule Name** - Select the type of network from the drop-down list.
- **Destination** - The destination is the destination host, subnet address, network address, or default route. The destination for a default route is 0.0.0.0.
- **Netmask** - The network mask is used in conjunction with the destination to determine when a route is used.
- **Gateway** - Enter the Router's IP address.
- **Metric** - A measurement of the preference of a route. Typically, the lowest metric is the most preferred route. If multiple routes exist to a given destination network, the route with the lowest metric is used.

IGMP Multicasting

The Router provides support for IGMP multicasting, which allows hosts connected to a network to be updated whenever an important change occurs in the network. A multicast is simply a message that is sent simultaneously to a pre-defined group of recipients. When joining a multicast group, all messages addressed to the group will be received by the user, much like when an E-mail message is sent to a mailing list.

IGMP multicasting enables UPnP capabilities over networks and may also be useful when connected to the Internet through the Router. When an application running on a computer in the network sends out a request to join a multicast group, the Router intercepts and processes the request. If the Router is set to "Minimum Security" no further action is required. However, if the Router is set to "Typical Security" or "Maximum Security," the group's IP address must be added to the Router's "Multicast Groups" screen. This will allow incoming messages addressed to the group to pass through the firewall and on to the correct networked computer.

1. Select **Routing** in the Advanced screen.
2. Activate the "Internet Group Management Protocol" check-box.
3. Click **Apply**.

Domain Routing

Domain routing is used in multi-router local network configurations. Normally, to accesss a device connected to one router from another router on the network, its IP address must be used. Activating domain routing (by clicking in the appropriate check box) allows the user to access to the computer by name (as well as IP address).

IP Address Distribution

The Router's DHCP server makes it possible to easily add computers configured as DHCP clients to the network. It provides a mechanism for allocating IP addresses to these hosts and for delivering network configuration parameters to them.

For example, a client (host) sends out a broadcast message on the network requesting an IP address for itself. The DHCP server then checks its list of available addresses and leases a local IP address to the host for a specific period of time and simultaneously designates this IP address as “taken.” At this point, the host is configured with an IP address for the duration of the lease.

The host can choose to renew an expiring lease or let it expire. If it chooses to renew a lease, it will also receive current information about network services, as it did with the original lease, allowing it to update its network configurations to reflect any changes that occurred since it first connected to the network. If the host wishes to terminate a lease before its expiration, it can send a release message to the DHCP server, which will then make the IP address available for use by others.

The Router's DHCP server:

- Displays a list of all DHCP hosts devices connected to the Router.
- Defines the range of IP addresses that can be allocated in the network.
- Defines the length of time for which dynamic IP addresses are allocated.
- Provides the above configurations for each network device and can be configured and enabled/disabled separately for each network device.
- Can assign a static lease to a network computer so that it receives the same IP address each time it connects to the network, even if this IP address is within the range of addresses that the DHCP server may assign to other computers.
- Provides the DNS server with the host name and IP address of each computer connected to the network.

To view a summary of the services currently being provided by the DHCP server, click **IP Address Distribution** in the Advanced screen. The “IP Address Distribution” screen appears.

IP Address Distribution				
Rule Name	Service	Subnet Mask	Dynamic IP Range	Action
Network (Home/Office)	DHCP Server	255.255.255.0	192.168.1.1 - 192.168.1.254	
Broadband Connection (Ethernet)	Disabled			
Broadband Connection (Coax)	Disabled			

Close **Connection List** **Access Control**

Editing DHCP Server Settings

To edit the DHCP server settings for a device:

1. Click the appropriate icon in the “Action” column. The “DHCP Settings” screen for the device appears.

DHCP Settings for Network (Home/Office)			
Service	IP Address Distribution:	DHCP Server	
DHCP Server			
Start IP Address:	192	.168	.1
End IP Address:	192	.168	.1
Subnet Mask:	255	.255	.0
WINS Server:	0	.0	.0
Lease Time In Minutes:	1440		
<input checked="" type="checkbox"/> Provide Host Name If Not Specified by Client			
IP Address Distribution According to DHCP Option 60 (Vendor Class Identifier)			
Vendor Class ID	Dynamic IP Range	QoS	Action
IP-STB	192.168.1.100-192.168.1.150	5 - Medium	
New IP Range			

Apply **Cancel**

2. Select the “IP Address Distribution” from the drop-down list. Options include **DHCP Server**, **DHCP Relay**, or **Disable**.

3. Complete the following fields:

- **Start IP Address Range, End IP Address Range** - determines the number of hosts connected to the network in this subnet. “Start” specifies the first IP address assigned in this subnet and “End” specifies the last IP address in the range.
- **Subnet Mask** - used to determine to which subnet an IP address belongs. An example of a subnet mask value is 255.255.0.0.
- **WINS Server** - The WINS (Windows Internet Naming Service) server determines the IP address associated with a network device.
- **Lease Time** - each device will be assigned an IP address by the DHCP server for a limited time (“Lease Time”) when it connects to the network. When the lease expires, the server will determine if the computer has disconnected from the network. If it has, the server may reassign this IP address to a newly-connected computer. This feature ensures that IP addresses not in use will become available for other computers on the network.
- **Provide host name if not specified by client** - when activated, the Router assigns the client a default name if the DHCP client does not have a host name.

4. Click **Apply** to save the changes.

DHCP Connections

To view a list of computers currently recognized by the DHCP server, click **Connection List** at the bottom of the IP Address Distribution screen. The “DHCP Connections” screen appears.

DHCP Connections							
Host Name	IP Address	Physical Address	Lease Type	Connection Name	Status	Expires In	Action
gateway2	192.168.1.2	00:90:27:b3:ce:49	Dynamic	Network (Home/Office)	Active	9931 minutes	  
New Static Connection							

Press the **Refresh** button to update the data.

Close **Refresh**

To define a new connection with a fixed IP address:

1. Click **New Static Connection** in the DHCP Connections screen. The “DHCP Connection Settings” screen appears.

DHCP Connection Settings	
Host Name:	<input type="text" value="new-host"/>
IP Address:	<input type="text" value="0.0.0.0"/>
MAC Address:	<input type="text" value="00:00:00:00:00:00"/>
Apply Cancel	

2. Enter a host name for this connection.
3. Enter the fixed IP address to assign to the computer.
4. Enter the MAC address of the computer’s network card.
5. Click the **Apply** to save changes.



Note: A device’s fixed IP address is actually assigned to the specific network card’s MAC address installed on the network computer. If this network card is replaced, the device’s entry in the DHCP Connections list must be updated with the new network card’s MAC address.

To remove a host from the table, click the appropriate “Delete” icon in the Action column.

Diagnostics

The Diagnostics screen can assist in testing network connectivity. This feature pings (ICMP echo) an IP address and displays the results, such as the number of packets transmitted and received, round trip time, and success status.

To diagnose network connectivity:

1. Click **Diagnostics** from the Advanced screen. The “Diagnostics” screen appears.

Diagnostics
The information below has been determined.

• Diagnostics can assist in testing network connectivity. This feature pings (ICMP echo) an IP address and displays the results, such as the number of packets transmitted and received, round trip time, and success status.

Ping (ICMP Echo)

Destination:	192.168.1.2	Go
Number of pings:	4	
Status:	Test Failed	
packets:	4/4 transmitted, 0/4 received, 100% loss	
Round Trip Time:	Minimum = 2147483647 ms Maximum = 0 ms Average = 0 ms	

Press the Refresh button to update the status.

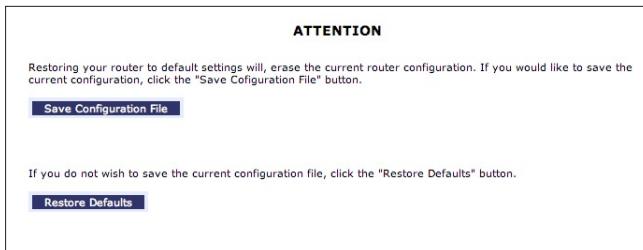
Close **Refresh** **Back**

2. Enter the IP address or domain name to be tested in the “Destination” field.
3. Click **Go**.
4. In a few seconds, diagnostics statistics will be displayed. If no new information is displayed, click **Refresh**.

Restoring Default Settings

If the Router's factory default settings need to be restored (to build a new network from the beginning, for example), use the following procedure:

1. If needed click Save Configuration File to save the Router's current configuration to a file. The Router's current settings can then be reapplied (see "Configuration File" in this chapter for more information).



2. Click **Restore Defaults**. The Router will restart, and factory default settings will be applied



Note: All of the Router's settings and parameters will be restored to their default values after performing the Restore Default procedure. This includes the administrator password; a user-specified password will no longer be valid.

Reboot the Router

To reboot the Router:

1. Click **Restart** in the Advanced screen. The "Restart" screen appears.



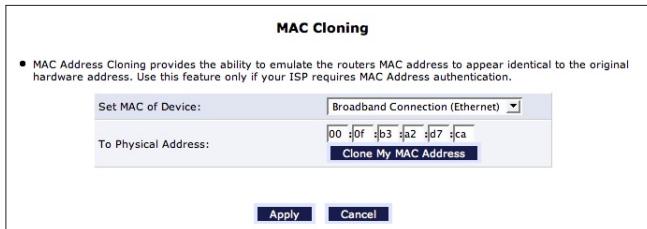
2. Click **OK** to restart the Router. This may take up to one minute.

To reenter the MegaControl Panel after restarting the Router, click the web browser's "Refresh" button.

MAC Cloning

A MAC (Media Access Control) address is a unique hexadecimal code that identifies a device on a network. All networkable devices have a MAC address. When replacing another network device with the Router, the installation process can be simplified by copying the MAC address of the existing computer to the Router. To do this:

1. Click **MAC Cloning** in the Advanced screen. The “MAC Cloning” screen appears.



2. Enter the MAC address to be cloned in the “To Physical Address” text boxes.
3. Click **Clone My MAC Address** to capture the MAC address of the computer currently accessing the MegaControl Panel. The Router will now have the new MAC address.

ARP (Address Resolution Protocol) Table

Clicking **ARP Table** in the Advanced screen generates the “ARP Table” screen. This screen displays the IP and MAC addresses of each DHCP connection.

ARP Table			
The ARP Table displays the IP and MAC addresses of each DHCP connection.			
ARP Table			
IP Address	MAC Address	Device	DHCP ACL
192.168.1.2	00:90:27:b3:ce:49	Network (Home/Office)	Add

Close **Refresh**

Users

To manage individual users:

1. Click **Users** in the Advanced screen, which generates the “Users” screen.

Users

- The Users page provides the ability to add or edit Admin or Guest access to the router.

Full Name	User Name	Permissions	Action
Administrator	admin	Administrator	
New User			

Close

2. Click **New User**, which generates the “User Settings” screen.

User Settings

General

Full Name:	<input type="text"/>
User Name (case sensitive):	<input type="text"/>
New Password:	<input type="text"/>
Retype New Password:	<input type="text"/>
Permissions:	<input type="text" value="Administrator"/>

E-Mail Notification

Configure Notification Mail Server
Notification Address: <input type="text"/>
System Notify Level: <input type="text" value="None"/>
Security Notify Level: <input type="text" value="None"/>

Apply **Cancel**

When adding a user, specify the following parameters:

- **Full Name** - The user’s full name.
- **User Name** - The name a remote user will use to access the home or office network. This entry is case-sensitive.
- **New Password/Retype New Password** - The password for the user (and enter again to confirm).
- **Permissions** - The level of access the user is allowed. Options include **Administrator** or **Limited**.

- **E-mail Notification** - E-mail notification can be used to receive indications of system events for a predefined severity classification. The available types of events are “System” or “Security” events. The available severity of events are **Error**, **Warning**, and **Information**.

To configure E-mail notification for a specific user:

1. Make sure an outgoing mail server has been configured in “System Settings”. If not, click **Configure Notification Mail Server** to configure the outgoing mail server.
2. Enter the user’s E-mail address in the “Notification Address” text box.
3. Select the “System” and “Security” notification levels in the “System Notify Level” and “Security Notify Level” drop-down lists.



Note: Changing any of the user parameters will prompt the connection associated with the user to terminate. For changes to take effect, activate the connection manually after modifying user parameters.

QoS

The Router’s QoS (Quality of Service) capabilities are covered in detail in Appendix A of this manual.

Local Administration

Clicking **Administration** in the Advanced screen generates the “Administration” screen. This screen allows the user to allow local Telnet access using a particular Telnet port.

Local Administration

Note: Only advanced technical users should use this feature.

Allow Local Telnet Access

Using Primary Telnet Port (23)

Using Secondary Telnet Port (8023)

Using Secure Telnet over SSL Port (992)

Apply **Cancel**

To use, select a Telnet port by clicking in the appropriate check box, then click **Apply**.

Remote Administration

The Router's Remote Administration capabilities are covered in detail in the "Security" chapter of this manual.

Dynamic DNS

Dynamic DNS (Domain Name Server) allows a dynamic IP address to be aliased to a static hostname, allowing a computer on the network to be more easily accessible from the Internet. Typically, when connecting to the Internet, the service provider assigns an unused IP address from a pool of IP addresses, and this address is used only for the duration of a specific connection. Dynamically assigning addresses extends the usable pool of available IP addresses, while maintaining a constant domain name. This allows a user to access a device (a camera, for example) from a remote location, since the device will always have the same IP address.

When using Dynamic DNS, each time the IP address provided by the ISP changes, the DNS database changes accordingly to reflect the change. In this way, even though the IP address of the computer changes often, its domain name remains constant and accessible.

Opening a Dynamic DNS Account

To use Dynamic DNS, a free Dynamic DNS account must be opened at <http://www.dyndns.org/account/create.html>.

When applying for an account, a user name and password must be specified. Have them available when customizing the Router's Dynamic DNS feature. For more information regarding Dynamic DNS, refer to <http://www.dyndns.org>.

Setting up Dynamic DNS

To set up Dynamic DNS on the Router, click **Dynamic DNS** in the Advanced screen. The “Dynamic DNS” screen appears.

Dynamic DNS

Setup Dynamic DNS (Domain Name Server).
Dynamic DNS is a dynamic IP address to be aliased to a static hostname, allowing a computer on the network to be more easily accessible from the Internet.

Connection to Update:	None
<input type="checkbox"/> Offline	
Status:	Not Updated
User Name:	<input type="text"/>
Password:	<input type="password"/>
Host Name:	<input type="text"/>
<input type="checkbox"/> Wildcard	
Mail Exchanger:	<input type="text"/>
<input type="checkbox"/> Backup MX	

Apply **Cancel**

Configure the following parameters:

Connection To Update

Select the connection with which to couple the Dynamic DNS service. Options include **Broadband Connection (Ethernet)**, **Broadband Connection (Coax)**, and **WAN PPPoE**.

Offline

Disable the Dynamic DNS feature by clicking this check box. This feature is available only to users who have purchased some type of upgrade credit from Dyndns.org. Note that changing the redirection URL can only be performed via the Dynamic DNS website.

User Name

Enter the Dynamic DNS user name in this text box.

Password

Enter the Dynamic DNS password in this text box.

Host Name

Enter the full Dynamic DNS domain in this text box.

Wildcard

Select the “Wildcard” check box to have any URL that includes the domain name (here.yourhost.dyndns.org, for example) to connect.

Mail Exchanger

Enter the mail exchange server address. This will redirect all E-mails arriving at the Dynamic DNS address to the mail server.

Backup MX

Select this check box to designate the mail exchange server to be a backup server.

DNS Server

The Domain Name System (DNS) translates domain names into IP addresses and vice versa. The Router’s DNS server is an auto-learning DNS, which means that when a new computer is connected to the network, the DNS server learns its name and automatically adds it to the DNS table. Other network users can immediately communicate with this computer using either its name or its IP address.

The Router’s DNS also provides the following services:

- Shares a common database of domain names and IP addresses with the DHCP server.
- Supports multiple subnets within the local network simultaneously.
- Automatically appends a domain name to unqualified names.
- Allows new domain names to be added to the database using the MegaControl Panel.
- Permits a computer to have multiple host names.
- Permits a host name to have multiple IPs (needed if a host has multiple network cards).

The DNS server does not require configuration. However, the list of computers known by the DNS can be viewed, the host name or IP address of a computer on the list can be changed, or a new computer can be added to the list.

DNS Table

To view the list of computers stored in the DNS table, click **DNS Server** in the Advanced screen. The “DNS Server” screen appears.

DNS Server

• Add, edit or delete computers known by the routers DNS Server.

Host Name	IP Address	Source	Action
gateway2	192.168.1.2	DHCP	
Add DNS Entry			

Close

To add a new entry to the list:

1. Click **Add DNS Entry** in the DNS Server screen. The “DNS Entry” screen appears.

DNS Entry

Host Name:	<input type="text" value="new-host"/>
IP Address:	<input type="text" value="0.0.0.0"/>

Apply **Cancel**

2. Enter the computer’s host name in the “Host Name” text box.
3. Enter the computer’s IP address in the “IP Address” text boxes.
4. Click **Apply** to save the changes.

To edit the host name or IP address of an entry:

1. Click the appropriate “Edit” icon in the Action column. The “DNS Entry” screen appears.

DNS Entry

Host Name:	<input type="text" value="gateway2"/>
------------	---------------------------------------

Apply **Cancel**

2. If the host was manually added to the DNS Table, its host name and/or IP address can be modified. Otherwise, only modify its host name.
3. Click **Apply** to save the changes.

To remove a host from the DNS table:

Click the appropriate “Delete” icon in the Action column. The entry will be removed from the table.

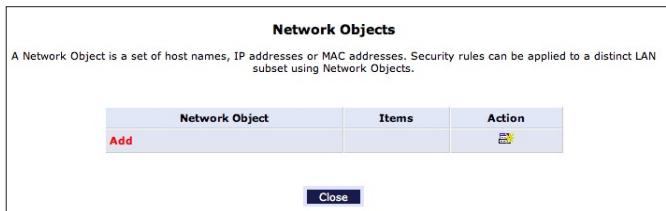
Network Objects

Network objects is used to define a part of the Router’s network (a group of computers, for example) by MAC addresses, IP addresses, and/or host names. The defined part becomes a “network object,” and settings, such as configuring system rules, can be applied to all the devices defined as part of the network object at once. For example, instead of setting the same website filtering configuration to five computers one at a time, the computers can be defined as a network object, and website filtering configuration can then be applied to all the computers simultaneously.

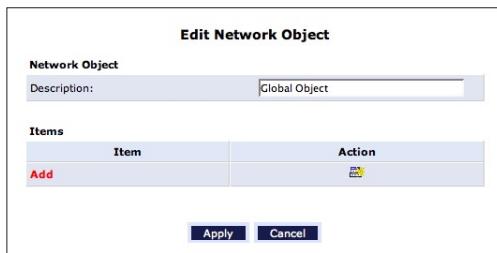
Network objects can be used to apply security rules based on host names instead of IP addresses. This may be useful, since IP addresses change from time to time. Moreover, it is possible to define network objects according to MAC addresses, making rule application more persistent against network configuration settings.

To define a network object:

1. Click **Network Objects** in the Advanced screen. The “Network Objects” screen appears.



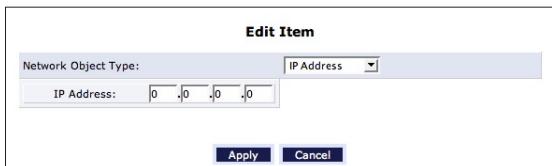
2. Click **Add**. The “Edit Network Object” screen appears.



The “Edit Network Object” screen is titled “Edit Network Object”. It has a “Network Object” section with a “Description” field containing “Global Object”. Below is a table titled “Items” with columns “Item” and “Action”. A single row shows “Add” in the Item column and a “New” icon in the Action column. At the bottom are “Apply” and “Cancel” buttons.

3. Specify a name for the network object in the “Description” text box.

4. Click **Add**. The “Edit Item” screen appears.



The “Edit Item” screen is titled “Edit Item”. It has a “Network Object Type” dropdown set to “IP Address” and an “IP Address” input field containing “0.0.0.0”. At the bottom are “Apply” and “Cancel” buttons.

5. Select the type of network object type from the “Network Object Type” list box. Options include IP address, IP Subnet, IP Range, MAC Address, and Host Name.

6. Repeat to create other network objects, if needed. When finished, click **Apply** to save all created network objects.

Universal Plug and Play (UPnP)

To access the UPnP settings perform the following:

1. Click **Universal Plug and Play** in the Advanced screen. The “Universal Plug and Play” settings screen appears.



The “Universal Plug and Play” screen is titled “Universal Plug and Play”. It contains a list of features: “Universal Plug and Play provides the ability for the router to have new UPnP supported devices connected without having to reconfigure or reboot the router.” Below are three checkboxes: “Allow Other Network Users to Control Wireless Broadband Router’s Network Features”, “Enable Automatic Cleanup of Old Unused UPnP Services”, and “WAN Connection Publication: Publish Only the Main WAN Connection”. At the bottom are “Apply” and “Cancel” buttons.

2. Click in the “Allow Other Network Users to Control Wireless Broadband Router’s Network Features” check box to enable UPnP and allow UPnP services to be defined on any of the network hosts.
3. Click in the “Enable Automatic Cleanup of Old Unused UPnP Services” check box to enable automatic cleanup of invalid rules. When enabled, this feature checks validity of all the UPnP services and rules every five minutes. Any old and not used UPnP defined service is removed, unless any user defined rule depends on it. Since there is a maximum limitation on the number of UPnP defined services (256), enable the cleanup feature if the limit is in danger of being exceeded.
4. Select whether all WAN connections, or only the main WAN connection, will have UPnP active, from the “WAN Connection Publication” drop-down list.

UPnP services are not deleted when disconnecting a computer without proper shutdown of the UPnP application (e.g. messenger). Thus, if running a boingo, services may often not be deleted, and will eventually lead to exhaustion of rules and services, and no new services can be defined. In this scenario, the cleanup feature will find the invalid services and remove them, preventing services exhaustion.

Protocols

Protocols features a list of preset and user-defined applications and common port settings. Protocols can be used in various security features, such as Access Control and Port Forwarding. New protocols can be added to support new applications or existing ones can be edited when needed.

To define a protocol:

1. Click **Protocols** in the Advanced screen. The “Protocols” screen appears.

Protocols		
Protocols	Ports	Action
FTP	TCP Any -> 21	 
HTTP	TCP Any -> 80	 
HTTPS	TCP Any -> 443	 
IMAP	TCP Any -> 143	 
L2TP	UDP Any -> 1701	 
L2TP (Port Triggering)	UDP Any -> 1701	 
Ping	ICMP Echo Request	 
POP3	TCP Any -> 110	 
SMTP	TCP Any -> 25	 
SNMP	UDP Any -> 161	 
Telnet	TCP Any -> 23	 
TFTP	UDP 1024-65535 -> 69	 
TFTP (Port Triggering)	UDP 1024-65535 -> 69	 
Traceroute	UDP 32769-65535 -> 33434-33523	 
	UDP Any -> 53	
	Any -> 69	
Voice Wing	Any -> 5060-5061	 
	Any -> 10000-20000	
Add		

Close **Advanced >>**

2. Click **Add** at the bottom of the screen. The “Edit Service” screen appears.

Edit Service		
Service Name:	Global Application	
Service Description:		
Server Ports		
Protocol	Server Ports	Action
Add Server Ports		 
Apply Cancel		

3. Name the service in the “Service Name” text box and, if needed, enter a description of the service in the “Service Description” text box, then click **Add Service Ports**. The “Edit Service Server Ports” screen appears.



4. Select a protocol from the “Protocol” drop-down list. To create a new protocol, select “Other.” After selecting a protocol, the screen will refresh, displaying the relevant text boxes needed to edit the particular protocol.
5. Click **Apply** to save the changes.

Monitoring the Router

9

The Wireless Broadband Router's System Monitoring screens display important system information, including:

- Basic Router settings
- System log
- Key network device parameters
- Network traffic statistics

Router Status

Click **System Monitoring** at the top of the Home screen to display the "Router Status" screen, which displays the Router's basic settings.

Router Status	
Firmware Version:	4.0.16.1.45.36
Model Name:	M1424-WR
Broadband Connection Status:	Disconnected
Broadband IP Address:	
Broadband MAC Address:	00:0F:B3:C0:05:0C
Broadband Connection Type:	Ethernet/Coax
Active Status:	2 hrs

Close

Advanced Status

Clicking Advanced Status displays three other monitoring options: System Logging, Full Status/System wide Monitoring of Connections, and Traffic Monitoring.



System Logging

Click **System Logging** in the Advanced Status screen to generate the “System Log” screen. The System Log displays a list of the most recent activities of the Router.

System Log			
Time	Event	Event-Type	Details
Press the Refresh button to update the data.			
Jan 2 21:26:34 2003	System Log	Message	kern.debug Clink Link Down (freq timer) [repeated 5 times, last time on Jan 2 21:26:39 2003]
Jan 2 21:26:34 2003	System Log	Message	daemon.warn Clink: clink1: ioctl(DRV_GET_MY_NODE_INFO) failed, res=-1: Bad address.
Jan 2 21:26:20 2003	System Log	Message	kern.debug Clink Link Down (freq timer) [repeated 13 times, last time on Jan 2 21:26:33 2003]
Jan 2 21:26:20 2003	System Log	Message	daemon.warn Clink: clink0: ioctl(DRV_GET_MY_NODE_INFO) failed, res=-1: Bad address.
Jan 2 21:26:04 2003	System Log	Message	kern.debug Clink Link Down (freq timer) [repeated 13 times, last time on Jan 2 21:26:19 2003]
Jan 2 21:26:04 2003	System Log	Message	daemon.warn Clink: clink0: ioctl(DRV_GET_MY_NODE_INFO) failed, res=-1: Bad address.
Jan 2 21:26:00 2003	System Log	Message	kern.debug Clink Link Down (freq timer) [repeated 4 times, last time on Jan 2 21:26:03 2003]
Jan 2 21:26:00 2003	System Log	Message	daemon.warn Clink: clink0: ioctl(DRV_GET_MY_NODE_INFO) failed, res=-1: Bad address.
Jan 2 21:25:54 2003	System Log	Message	kern.debug Clink Link Down (freq timer) [repeated 5 times, last time on Jan 2 21:25:59 2003]
Jan 2 21:25:54 2003	System Log	Message	daemon.warn Clink: clink1: ioctl(DRV_GET_MY_NODE_INFO) failed, res=-1: Bad address.

Full Status/System wide Monitoring of Connections

1. Click **Full Status/System wide Monitoring of Connections** in the Advanced Status screen to generate the “Full Status/System wide Monitoring of Connections” screen, which features a table summarizing the monitored connection data.
2. Click **Refresh** to update the table, or click **Automatic Refresh On** to constantly update the displayed parameters.

Full Status/System wide Monitoring of Connections									
NOTE: Only advanced technical users should use this feature									
Rule Name	Network (Home/Office)	Broadband Connection (Ethernet)	Ethernet	Broadband Connection (Coax)	Coax	Wireless Access Point	WAN PPPoE	WAN PPPoE 2	
Status	Connected	Down	Connected	DHCP IP Address Released	Down	Connected	Disabled	Disabled	
Network	Network (Home/Office)	Broadband Connection	Network (Home/Office)	Broadband Connection	Network (Home/Office)	Network (Home/Office)	Broadband Connection	Broadband Connection	
Underlying Device	Ethernet; Wireless Access Point; Coax properties; Coax Stats						Broadband Connection (Ethernet)	Broadband Connection (Coax)	
Connection Type	Bridge	Ethernet	Hardware Ethernet Switch	Coax Link Ethernet	Coax Link Ethernet	Wireless Access Point	PPPoE	PPPoE	
MAC Address	00:0f:b3:a2:d7:c6	00:0f:b3:a2:d7:ca	00:0f:b3:a2:d7:c7	00:0f:b3:a2:d7:cb	00:0f:b3:a2:d7:c8	00:0d:f0:1d:00:cc			
IP Address	192.168.1.1								
Subnet Mask	255.255.255.0								
IP Address Distribution	DHCP Server	Disabled	Disabled	Disabled	Disabled	Disabled			
Service Name									
User Name							qa2@local	qa2@local	
Received Packets	11835	0	8760	0	0	1427922			
Sent Packets	845051	0	614542	0	0	233910			
Time Span	70:27:09	70:27:09	70:27:09	70:27:09	70:27:09	70:27:09			
Channel				Disconnected	Disconnected				
<input type="button" value="Close"/> <input type="button" value="Automatic Refresh Off"/> <input type="button" value="Refresh"/>									

Traffic Monitoring

The Router constantly monitors traffic within the local network and between the local network and the Internet. To view up-to-the-second statistical information about data received from and transmitted to the Internet, and about data received from and transmitted to computers in the local network, click **Traffic Monitoring** in the Advanced Status screen. This generates the “Traffic Monitoring” screen. This generates the “Traffic Monitoring” screen.

Traffic Monitoring									
Rule Name	Network (Home/Office)	Broadband Connection (Ethernet)	Ethernet	Broadband Connection (Coax)	Coax	Wireless Access Point	WAN PPPoE	WAN PPPoE 2	
Status	Connected	Down	Connected	Down	Down	Connected	Disabled	Disabled	
Network	Network (Home/Office)	Broadband Connection	Network (Home/Office)	Broadband Connection	Network (Home/Office)	Network (Home/Office)	Broadband Connection	Broadband Connection	
Underlying Device	Ethernet Wireless Access Point Coax						Broadband Connection (Ethernet)	Broadband Connection (Coax)	
Connection Type	Bridge	Ethernet	Hardware Ethernet Switch	Coax Link Ethernet	Coax Link Ethernet	Wireless Access Point	PPPoE	PPPoE	
IP Address	192.168.1.1								
Received Packets	16485	0	14317	0	0	1714079			
Sent Packets	589779	0	431658	0	0	162575			
Received Bytes	3726194	0	3465635	0	0	142844698			
Sent Bytes	88379904	0	58305737	0	0	35697647			
Receive Errors	0	0	0	0	0	0			
Receive Drops	0	0	0	0	0	0			
Time Span	48:21:56	48:21:56	48:21:56	48:21:56	48:21:56	48:21:56			

Troubleshooting

10

This chapter contains a list of problems that may be encountered while using the Wireless Broadband Router, and techniques to try and overcome the problem. Note that these techniques may not solve the problem (or problems).

Accessing the Router if Locked Out

If the Router's connection is lost while making configuration changes, a setting that locks access to the MegaControl Panel may have inadvertently been activated. There are three common ways to lock access to the Router:

Scheduler If a schedule has been created that applies to the computer over the connection being used, the Router will not be accessible during the times set in the schedule. To regain access, either wait until the connection is scheduled to be active again, or restore the default settings to the Router.

LAN Firewall If the firewall setting for the local network is set to maximum, no computers from the network will be able to connect to the Router. To gain access, restore the default settings to the Router.

Access Control If the access control setting for the computer is set to block the computer, access to the Router will be denied. To gain access, restore the default settings to the Router.

Restoring the Router's Default Settings

There are two ways to restore the Router's default settings. The first is to use the tip of a ballpoint pen and depress the "Reset" button on the back of the Router for at least five seconds. The second is to access the Router's MegaControl Panel and navigate to the "Advanced Settings" screen. Click on "Restore Defaults" and read the instructions on-screen. Note that after performing either of these two procedures, all previously saved settings on the Router will be lost.

LAN Connection Failure

- Ensure the Router is properly installed, the LAN connections are correct, and the power is on.
- Confirm the computer and Router are on the same network segment. If unsure, let the computer get the IP address automatically by initiating the DHCP function, then verify the computer is using an IP address within the default range (192.168.1.2 through 198.168.1.254). If the computer is not using an IP address within the range, it will not connect to the Router.
- Ensure the Subnet Mask address is set to 255.255.255.0.

Time out error occurs when entering a URL or IP Address

- Verify all the computers are working properly.
- Ensure the IP settings are correct.
- Ensure the Router is on and connected properly.
- Verify the Router's settings are the same as the computer.

I've run out of Ethernet ports on my Router. How do I add more computers?

Plugging in an Ethernet hub or switch expands the number of ports on the Router. Run a standard Ethernet cable from the “Uplink” port of the new hub or switch to a yellow Ethernet port on the Router.

How do I change the password on the Router's Graphic User Interface?

From the Router's GUI Home screen, click **Advanced**, then **Users**. From the “Users” screen, click **Administrator**, which generates the “User Settings” screen. In the “General” section of the screen, change the password.

Is the wireless option on by default on the Router?

Yes. The Router's wireless option is activated out of the box.

Is the wireless security on by default when the wireless option is activated?

Yes, with a unique 64-bit WEP (Wired Equivalent Privacy) key for each unit.

Which connection speeds does the Router support?

The Ethernet Internet connection supports 100 Mbps. The 802.11g wireless connection supports up to 54 Mbps (depending on signal quality, etc.). The MoCA connection supports 270 Mbps.

Are the Router's Ethernet ports auto-sensing?

Yes. Either a straight-through or crossover Ethernet cable can be used.

Can I use an 802.11b wireless card to connect to the Router?

Yes, the Router can interface with 802.11b cards or 802.11g cards. The 802.11g standard is backward compatible with the 802.11b standard. The Router can be setup to handle just “g” wireless cards, just “b” wireless cards, or both.

Can my wireless signal pass through floors, walls, and glass?

The physical environment surrounding the Router can have a varying effect on signal strength and quality. The more dense the object (a concrete wall compared to a plaster wall, for example), the greater the interference. Concrete or metal-reinforced structures will experience a higher degree of signal loss than those made of wood, plaster, or glass.

How do I find out what IP address my computer is using?

Windows 95, 98, 98SE, and Me - Select **Start**, **Run**, and type “winipcfg.” Press **Enter**. When the “Winipcfg” window appears, ensure your network device is selected.

Windows NT, 2000, and XP - Select **Start**, **Run** and type “cmd.” Press **Enter**. When the command screen appears, type “ipconfig” and press **Enter**.

My computer cannot connect to the Internet via MoCA. What should I do?

First, check the connection, and make sure all cables are connected correctly. Then make sure the NIM is still connected, and check the Ethernet connection to the NIM from the computer. A computer cannot be connected directly via a MoCA cable; it must go through a NIM to connect. The NIM converts the MoCA signal to an Ethernet signal the computer can understand.

I used DHCP to configure my network. Do I need to restart my computer to refresh my IP address?

No. Follow these steps to refresh the IP address:

Windows 95, 98, 98SE, and Me - Select **Start**, **Run**, type “winipcfg,” and press **Enter**. Ensure the Ethernet adapter is selected in the device box. Press the **Release_all** button, then press the **Renew_all** button.

Windows NT 4.0 and 2000 - Select **Start**, **Run**, type “cmd,” and press **Enter**. At the DOS prompt, type “ipconfig /release,” then type “ipconfig /renew.”

Windows XP - Unplug the Ethernet cable or wireless card and plug it back in.

I cannot access the Router's Graphical User Interface? What should I do?

If you cannot access the Router's Graphical User Interface, make sure the computer connected to the Router is set up to dynamically receive an IP address.

I have an FTP or Web server on my network. How can I make it available to users on the Internet?

For a Web server, enable port forwarding for port 8088 to the IP address of the server and set up the Web server to receive on that port, as well. (Configuring the server to use a static IP address is recommended.)

For an FTP server, enable port forwarding for port 21 to the IP address of the server. (Configuring the server to use a static IP address is recommended.)

How many computers can be connected through the Router?

The Router is capable of 254 connections, but it is recommended to have no more than 45 connections. As you increase the number of connections, you decrease the available speed for each computer.

What is the default user name for the Router?

The default user name for the router is “admin” and the default password is “password” (all lower case, no quotation marks). When logging into the Router the first time (or after restoring the Router's default settings), the user is asked to create a new user name and password after entering the default user name and password. Enter the new user name and password, write them down on a piece of paper, and keep it in a safe place. The new user name and password will be needed to access the User Interface in the future.

Quality of Service

A

Network-based applications and traffic are growing at a high rate, producing an ever-increasing demand for bandwidth and network capacity. For obvious reasons, bandwidth and capacity cannot be expanded infinitely, requiring that bandwidth-demanding services be delivered over existing infrastructure, without incurring additional expensive investments. The next logical means of ensuring optimal use of existing resources are Quality of Service (QoS) mechanisms for congestion management and avoidance.

Quality of Service refers to the capability of a network device to provide better service to selected network traffic. This is achieved by shaping the traffic and processing higher priority traffic before lower priority traffic.



STOP! Do not change any Quality of Service settings unless instructed to do so by the ISP.

Traffic Priority

Traffic Priority manages and avoid traffic congestion by defining inbound and outbound priority rules for each device on the Router. These rules determine the priority that packets, traveling through the device, will receive. QoS parameters (DSCP marking and packet priority) are set per packet, on an application basis.

QoS can be configured using flexible rules, according to the following parameters:

- Source/destination IP address, MAC address, or host name
- Device
- Source/destination ports
- Limit the rule for specific days and hours

The Router supports two priority marking methods for packet prioritization:

- DSCP
- 802.1p Priority

The matching of packets by rules is connection-based, known as Stateful Packet Inspection (SPI), using the Router's firewall mechanism. Once a packet matches a rule, all subsequent packets with the same attributes receive the same QoS parameters, both inbound and outbound. Connection-based QoS also allows inheriting QoS parameters by some of the applications that open subsequent connections. For instance, QoS rules can be defined on SIP, and the rules will apply to both control and data ports (even if the data ports are unknown). Applications that support such inheritance have an ALG in the firewall. They are:

- SIP
- MSN Messenger/Windows Messenger
- TFTP
- FTP
- MGCP
- H.323
- Port triggering applications
- PPTP
- IPSec

Setting Priority Rules

To set priority rules:

1. Click **Quality of Service** in the Advanced screen. The “Traffic Priority” screen appears. This screen is divided into two identical sections, one for “QoS input rules” and the other for “QoS output rules,” which are for prioritizing the inbound and outbound traffic, respectively. Each section lists all the devices on which rules can be set. Rules can be set on all devices at once by clicking **Add** in the “All Devices” row.

Traffic Priority								
QoS Input Rules								
Rule ID	Device	Source Address	Destination Address	Protocols	Operation	Status	Action	
All Devices								Add
Network (Home/Office) Rules								Add
Broadband Connection (Ethernet) Rules								Add
Ethernet Rules								Add
Broadband Connection(Coax) Rules								Add
Coax Rules								Add
Wireless Access Point Rules								Add
WAN PPPoE Rules								Add
WAN PPPoE 2 Rules								Add
QoS Output Rules								
Rule ID	Device	Source Address	Destination Address	Protocols	Operation	Status	Action	
All Devices								Add
Network (Home/Office) Rules								Add
Broadband Connection (Ethernet) Rules								Add
Ethernet Rules								Add
Broadband Connection(Coax) Rules								Add
Coax Rules								Add
Wireless Access Point Rules								Add
WAN PPPoE Rules								Add
WAN PPPoE 2 Rules								Add

[Apply](#) | [Cancel](#) | [Resolve Now](#) | [Refresh](#)

2. After choosing the traffic direction and the device on which to set the rule, click **Add** in the appropriate row. The “Add Traffic Priority Rule” screen appears.

The screenshot shows the 'Add Traffic Priority Rule' configuration screen. It includes sections for Matching (Source Address, Destination Address, Protocol, DSCP), QoS Operation (DSCP), and Logging (Log Packets Matched by This Rule, When should this rule occur?). There are also checkboxes for Set Priority, Set Rx Class Name, and Set Tx Class Name. Buttons at the bottom include 'Apply' and 'Cancel'.

Set the following parameters:

Source Address - The source address of the packets sent to or received from the network object. To add an address:

1. Select **Specify Address** from the drop-down list. The screen refreshes and an “Add” link appears.
2. Click **Add**, then add a new network object (see the “Advanced Settings” chapter to learn how to add a network object). Clicking Add is the same as clicking “New Entry” in the “Network Objects” screen.

Destination Address - The destination address of the packets sent to or received from the network object. This address can be configured in the same manner as the source address.

Protocol - Choose a specific traffic protocol from the drop-down list, or add a new one. To add a new traffic protocol:

1. Select **Specify Address** from the drop-down list. The screen refreshes and an “Add” link appears.
2. Click **Add**, and add a new protocol (see the “Advanced Settings” chapter to learn how to add a protocol). Note that clicking Add is equivalent to clicking “New Entry” in the “Protocols” screen.

Set Priority - Activate this check box to add a priority to the rule. The screen will refresh, allowing a selection between one of eight priority levels, zero being the lowest and seven the highest (each priority level is mapped to low/medium/high priority). This sets the priority of a packet on the connection matching the rule, while routing the packet.

Set DSCP - Activate this check box to mark a DSCP value on packets matching a connection that matches this rule. The screen will refresh, allowing the user to enter the Hex value of the DSCP.

Log Packets Matched by This Rule - Check this check box to log the first packet from a connection matched by this rule.

Schedule - By default, the rule will always be active. However, scheduler rules can be configured to define time segments during which the rule may be active.

Traffic Shaping

Traffic Shaping is the solution for managing and avoiding congestion where the network meets limited broadband bandwidth. Typical networks use a 100 Mbps Ethernet LAN with a 100 Mbps WAN interface router. This is where most bottlenecks occur.

A traffic shaper is essentially a regulated queue that accepts uneven and/or bursty flows of packets and transmits them in a steady, predictable stream so that the network is not overwhelmed with traffic. While traffic priority allows basic prioritization of packets, traffic shaping provides more sophisticated definitions, such as:

- Bandwidth limit for each device
- Bandwidth limit for classes of rules
- Prioritization policy
- TCP serialization on a device

Additionally, QoS traffic shaping rules can be defined for a default device. These rules will be used on a device that has no definitions of its own. This enables the definition of QoS rules on the default WAN, for example, and their maintenance even if the PPP or bridge device over the WAN is removed.

Device Traffic Shaping

This section describes the different Traffic Shaping screens and terms, and presents the feature's configuration logic.

1. Click **Quality of Service** in the Advanced screen, then click **Traffic Shaping**. The following screen appears.

Traffic Shaping				
Device	Rx Bandwidth (Kbits/s)	Tx Bandwidth (Kbits/s)	TCP Serialization	Action
✓ Any Device				 
Add				 

Apply **Cancel**

2. Click **Add**. The “Add Device Traffic Shaping” screen appears.
3. Select the device for which the traffic will be shaped. The drop-down list includes all the Router’s devices, as well as the option to select all devices in each category (e.g., “All LAN Devices,” “All WAN Devices”). In this example, select the default WAN device option.

Add Device Traffic Shaping	
Device:	<input type="button" value="Default WAN device"/>
Apply Cancel	

4. Click **Apply**. The “Edit Device Traffic Shaping” screen appears.

Edit Device Traffic Shaping						
Device:	Default WAN device					
Tx Traffic Shaping						
Tx Bandwidth:		97656 Kbits/s				
TCP Serialization:		<input type="button" value="Disable"/>				
Class ID	Rule Name	Priority	Bandwidth (Kbits/s)		Status	Action
			Reserved	Maximum		 
Add						
 Rx Traffic Policing						
Rx Bandwidth:		97656 Kbits/s				
Class ID	Rule Name	Bandwidth (Kbits/s)		Status	Action	
		Reserved	Maximum			 
Add						

Apply **Cancel**

Configure the following parameters:

Tx Bandwidth - Tx bandwidth limits the Router's bandwidth transmission rate. The purpose is to limit the bandwidth of the WAN device to that of the weakest outbound link.. This forces the Router to be the network bottleneck, where sophisticated QoS prioritization can be performed.

Rx Bandwidth - In the same manner, this Rx bandwidth limits the Router's bandwidth reception rate.

TCP Serialization - Enable TCP Serialization from its drop-down list, either for active voice calls only or for all traffic. The screen will refresh, adding a “Maximum Delay” text box. This function allows the maximum allowed transmission time frame (in milliseconds) of a single packet to be defined. Any packet requiring a longer time to be transmitted will be fragmented to smaller sections. This avoids transmission of large, bursty packets that can cause delay or jitter for real-time traffic, such as VoIP.

Shaping Classes

The bandwidth of a device can be divided to reserve constant portions of bandwidth to predefined traffic types. Such a portion is known as a shaping class. When not used by its predefined traffic type or owner (for example VoIP), the class will be available to all other traffic. However, when needed, the entire class is reserved solely for its owner. Also, the maximum bandwidth that a class uses can be limited, even if the entire bandwidth is available.

When a shaping class is defined for a specific traffic type, two shaping classes are created. The second class is the “Default Class”, which is responsible for all the packets that do not match the defined shaping class, or any other classes that might be defined on the device. This can be viewed in the “Class Statistics” screen.

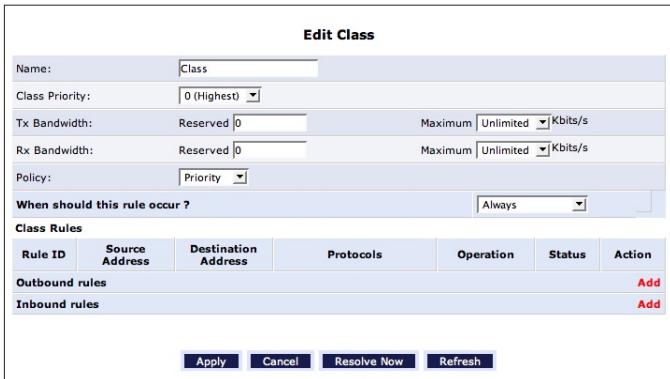
To define a shaping class:

1. Click **Add** in the “Tx Traffic Shaping” section of the Edit Device Traffic Shaping screen. The “Add Shaping Class” screen appears.



The screenshot shows a simple dialog box titled "Add Shaping Class". It has a single input field labeled "Rule Name" containing the text "Class". Below the input field are two buttons: "Apply" on the left and "Cancel" on the right.

2. Name the new class and click **Apply**.
3. Click the class name to edit the shaping class. The “Edit Class” screen appears.



The screenshot shows the "Edit Class" configuration screen. The class is named "Class". The "Class Priority" is set to "0 (Highest)". The "Tx Bandwidth" is "Reserved 0" with a "Maximum" of "Unlimited" Kbits/s. The "Rx Bandwidth" is "Reserved 0" with a "Maximum" of "Unlimited" Kbits/s. The "Policy" is set to "Priority". The "When should this rule occur?" dropdown is set to "Always". Below this is a table titled "Class Rules" with two rows: "Outbound rules" and "Inbound rules", each with an "Add" button. At the bottom are "Apply", "Cancel", "Resolve Now", and "Refresh" buttons.

Configure the following parameters:

Name Enter the name of the class in this text box.

Class Priority The class can be granted one of eight priority levels, zero being the highest and seven the lowest (opposite the rules priority levels). This level sets the priority of a class in comparison to other classes on the device.

Tx Bandwidth Tx bandwidth is the reserved transmission bandwidth in kilobits per second. The maximum allowed bandwidth can be limited by selecting **Specify** from the drop-down list. The screen will refresh, adding another “Kbits/s” text box. Enter the desired maximum allowed bandwidth.

Rx Bandwidth In the same manner, Rx bandwidth is the reserved reception bandwidth, which can also be limited to a maximum allowed bandwidth.

Policy The class policy determines the policy of routing packets inside the class. Select one of four options:

- **Priority** - Priority queuing utilizes multiple queues, so that traffic is distributed among queues based on priority. This priority is defined according to packet's priority, which can be defined explicitly, by a DSCP value, or by an 802.1p value.
- **FIFO** - The “First In, First Out” priority queue. This queue ignores any previously-marked priority the packets may have.
- **Fairness** - The fairness algorithm ensures no starvation by granting all packets a certain level of priority.
- **RED** - The RED (Random Early Detection) algorithm utilizes statistical methods to drop packets in a “probabilistic” way before queues overflow. Dropping packets in this way slows a source down enough to keep the queue steady and reduces the number of packets lost when a queue overflows and a host is transmitting at a high rate.

Schedule By default, the class will always be active. However, scheduler rules can be configured to define time segments during which the class may be active.

Class Rules Class rules define which packets belong to the class. They must be defined in order to associate packets that meet them with the shaping class. Without class rules, the shaping class will have no effect. Each class can have outbound and/or inbound rules for outgoing and incoming traffic, respectively. For example, all outgoing packets from computer A in the network can be defined as belonging to the VoIP class. These packets will be limited to the class settings (bandwidth, schedule, etc.). In addition, the traffic protocol and priority for each rule can be defined (this is not mandatory as it is with Traffic Priority rules).

To add a new outbound/inbound class rule, click **Add** in the Edit Class screen. The “Add Traffic Priority Rule” screen appears.

The screenshot shows the 'Add Traffic Priority Rule' configuration window. It has several sections: 'Matching' (Source Address: Any, Destination Address: Any, Protocol: ANY, DSCP: None, Device: Any), 'QoS Operation' (DSCP: None), and 'Logging' (Set Priority, Log Packets Matched by This Rule). The 'When should this rule occur?' dropdown is set to 'Always'. At the bottom are 'Apply' and 'Cancel' buttons.

Source Address - The source address of the packets sent to or received from the network object (computer A in the above example). To add an address:

1. Select **Specify Address** from the drop-down list. The screen will refresh and an “Add” link appears.
2. Click **Add**, and add a new network object. Note that clicking Add is equivalent to clicking “New Entry” in the “Network Objects” screen.

Destination Address - The destination address of the packets sent to or received from the network object. This address can be configured in the same manner as the source address.

Protocol - Select a specific traffic protocol from the drop-down list, or add a new one. To add a new traffic protocol:

1. Select **Specify Protocol** from the drop-down list. The screen will refresh and an “Add” link appears.
2. Click **Add**, and add a new protocol. This is the same as clicking “New Entry” in the “Protocols” screen.

DSCP - Use this drop-down list to mark a DSCP value on packets matching a connection that matches this rule. To do so, select **Specify** from the drop-down list and enter the hexadecimal value of the DSCP.

Set Priority - Activate this check box to add a priority to the rule. The screen will refresh, allowing a selection of one of eight priority levels, zero being the lowest and seven the highest (each priority level is mapped to low/medium/high priority). This sets the priority of a packet on the connection matching the rule, while routing the packet.

Log Packets Matched by This Rule - Check this check box to log the first packet from a connection that was matched by this rule.

When should this rule occur? - By default, the rule will always be active. However, scheduler rules can be configured to define time periods during which the rule is active. To learn how to configure scheduler rules, see the “Advanced Settings” chapter.

 **Note:** The hierarchy of the class rules is determined by the addition order to the class. For example, if the first rule is “match packets with any source address, any destination address, and any protocol to this class,” all packets traveling through Router will be associated with the specific class. Any rules defined later will not have any effect.

Ingress Data

The Router can control outgoing data fairly easily. It can queue packets, delay them, give precedence to other packets, or drop them. This helps in resolving upload (Tx) traffic bottlenecks, and in most cases is sufficient. However, in the case of download (Rx) traffic bottlenecks, the ability to control the flow is much more limited. The Router cannot queue packets, since in most cases the local network (LAN) is much faster than the Internet (WAN), and when the Router receives a packet from the Internet, it passes it immediately to the local network.

QoS for ingress data has the following limitations, which do not exist for outgoing data:

- QoS can only be applied to TCP streams (UDP streams cannot be delayed)
- No borrowing mechanism
- When reserving Rx bandwidth, it is strictly taken from the bandwidth of all other classes

Furthermore, the Router cannot control the behavior of the ISP, which may not have proper QoS handling. Unfortunately, this is a common situation. Let's look at a scenario of downloading a large file and surfing the Internet at the same time. Downloading the file is distinguished by small requests, followed by very large responses. This may result in blocking HTML traffic at the ISP. A solution for such a situation is limiting the bandwidth of low-priority TCP connections (such as the file download).

Differentiated Services Code Point Settings

In order to understand what DSCP is, one must first be familiarized with the Differentiated Services model.

Differentiated Services (Diffserv) is a Class of Service (CoS) model that enhances best-effort Internet services by differentiating traffic by users, service requirements, and other criteria. Packets are specifically marked, allowing network nodes to provide different levels of service, as appropriate for voice calls, video playback, or other delay-sensitive applications, via priority queuing or bandwidth allocation, or by choosing dedicated routes for specific traffic flows.

Diffserv defines a field in IP packet headers referred to as the Differentiated Services Codepoint (DSCP). Hosts or routers passing traffic to a Diffserv-enabled network will typically mark each transmitted packet with an appropriate DSCP. The DSCP markings are used by Diffserv network routers to appropriately classify packets and to apply particular queue handling or scheduling behavior.

The Router provides a table of predefined DSCP values, which are mapped to 802.1p priority marking method. Any of the existing DSCP setting can be edited or deleted, and new entries can be added.

1. Click Quality of Service at the top of the Home screen, then click **DSCP Settings**. The “DSCP Settings” screen appears.

DSCP Settings		
DSCP Value (hex)	802.1p Priority	Action
0x0	0 - Low	 
0x2	0 - Low	 
0x4	4 - Medium	 
0x6	4 - Medium	 
0x8	2 - Low	 
0xA	1 - Low	 
0xC	3 - Low	 
0xE	2 - Low	 
0x10	7 - High	 
0x12	6 - High	 
0x14	7 - High	 
0x16	6 - High	 
0x18	5 - Medium	 
0x1A	5 - Medium	 
0x1C	5 - Medium	 
0x1E	5 - Medium	 
0x20	7 - High	 
Add		

2. To edit an existing entry, click the appropriate icon in the “Action” column. To add a new entry, click **Add**. In either case, the “Edit DSCP Settings” screen appears.

Edit DSCP Settings

DSCP Value (hex):	<input type="text"/>
802.1p Priority:	<input type="button" value="0 - Low"/>
Apply Cancel	

3. Configure the following parameters:

DSCP Value (hex) - Enter the DSCP value as a hexadecimal value.

802.1p Priority - Select a 802.1p priority level from the drop-down list, zero being the lowest and seven the highest (each priority level is mapped to low/medium/high priority). The default DSCP value for packets with an unassigned value is zero.

4. Click **Apply** to save the settings.

802.1p Settings

The IEEE 802.1p priority marking method is a standard for prioritizing network traffic at the data link/Mac sub-layer. 802.1p traffic is simply classified and sent to the destination, with no bandwidth reservations established.

The 802.1p header includes a 3-bit prioritization field, which allows packets to be grouped into eight levels of priority. By default, the highest priority is seven, which might be assigned to network-critical traffic. Values five and six may be applied to delay-sensitive applications such as interactive video and voice. Data classes four through one range from controlled-load applications down to “loss eligible” traffic. Zero is the value for unassigned traffic and used as a best effort default, invoked automatically when no other value has been set.

A packet can match more than one rule. This means that:

- The first class rule has precedence over all other class rules (scanning is stopped once the first rule is reached).
- The first traffic-priority (classless) rule has precedence over all other traffic priority rules.
- There is no prevention of a traffic-priority rule conflicting with a class rule. In this case, the priority and DSCP setting of the class rule (if given) will take precedence.

1. Click **Quality of Service** in the Advanced screen, then click **802.1p Settings**. The “802.1p Settings” screen appears.

802.1p Settings	
802.1p Value	Priority
0	Low
1	Low
2	Low
3	Low
4	Medium
5	Medium
6	High
7	High

Apply **Cancel**

2. The eight 802.1p values are pre-populated with the three priority levels: Low, Medium, and High. These levels can be changed for each of the eight values in their respective drop-down lists.
3. Click **Apply** to save the settings.

Class Statistics

The Router provides accurate, real-time information on the traffic moving through the defined device classes. For example, the amount of packets sent, dropped, or delayed are just a few of the parameters monitored per each shaping class.

To view class statistics, click **Quality of Service** at the top of the Home screen, then click **Class Statistics**. The following screen appears. Note that class statistics will only be available after defining at least one class (otherwise the screen will not present any information).

Class Statistics						
Class	packets sent	Bytes sent	packets dropped	packets delayed	Rate (bytes/s)	Packet Rate

Close **Automatic Refresh On** **Refresh**

Class Identifier

To create a class identifier, click **Quality of Service** in the Advanced screen, then click **Class Identifier**. The “DHCP Server Pool Settings” screen appears.

DHCP Server Pool Settings		
DHCP Option 60 (Vendor Class Identifier):	<input type="text"/>	
Start IP Address:	0 .0 .0 .0	
End IP Address:	0 .0 .0 .0	
<input checked="" type="checkbox"/> Set Priority	7-High <input type="button" value="▼"/>	
Apply Cancel		

Enter the information needed in the appropriate text boxes, then click **Apply**.

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Specifications

B

General

Model Number

MI424WR (4-Port Wireless Broadband Router)

Standards

IEEE 802.3x

IEEE 802.3u

IEEE 802.11b, g (Wireless)

IP

IP version 4

MoCA

Two channels (WAN, LAN)

WAN MoCA frequency: 975 MHz - 1025 MHz (single channel)

LAN MoCA frequency: 1125 MHz - 1425 MHz (6 channel)

Firewall

ICSA certified

Speed

LAN Ethernet: 10/100 Mbps auto-sensing

Wireless: 802.11g 54 Mbps optimal (see "Wireless Operating Range" for details)

Cabling Type

Ethernet 10BaseT: UTP/STP Category 3 or 5

Ethernet100BaseTX: UTP/STP Category 5

Wireless Operating Range

Indoors

Up to 91 M (300 ft.)

Outdoors

Up to 533 M (1750 ft.)

Topology

Star (Ethernet)

LED Indicators

Power, Ethernet WAN, Ethernet LAN (4), Coax WAN, Coax LAN, Internet, Wireless

Environmental

Power

External, 5V DC, 3A

Certifications

FCC Part 15, UL-60959-1

Operating Temperature

0° C to 40° C (32° F to 104° F)

Storage Temperature

-20° C to 70° C (-4° F to 158° F)

Operating Humidity

8% to 93% (non-condensing)

Storage Humidity

5% to 100% (non-condensing)



Note: Specifications are subject to change without notice.